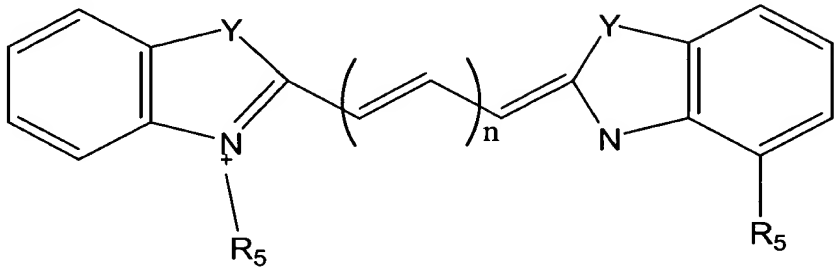
106. The recording medium of claim 105 wherein the colorless electron donating type dry precursor compound has at least one of a lactone, a lactam, a sulfone, a spiropyran, an ester or an amido structure.

107. The recording medium of claim 105 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of triarylmethane compounds, bisphenylmethane compounds, xanthene compounds, xanthene compounds, thiazine compounds, spiropyran compounds and the like.

108. The recording medium of claim 107 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of Crystal Violet lactone, benzoyl leuco methylene blue, Malachite Green Lactone, p-nitrobenzoyl leuco methylene blue, 3-dialkylamino-7-dialkylamino-fluoran, 3-methyl-2,2'-spirobi(benzo-f-chrome), 3,3-bis(p-dimethylaminophenyl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-methylindole-3-yl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-phenylindole-3-yl)phthalide, 3,3-bis(1,2-dimethylindole-3-yl-5-dimethylaminophthalide, 3,3-bis-(1,2-dimethylindole-3-yl)6-dimethylaminophthalide, 3,3-bis-(9-ethylcarbazole-3-yl)-5-dimethylaminophthalide, 3,3-bis(2-phenylindole-3-yl)-5-dimethylaminophthalide, 3-p-dimethylaminophenyl-3-(1-methyl pyrrole-2-yl)-6-dimethylaminophthalide, 4,4'-bis-dimethylaminobenzhydrin benzyl ether, N-halophenyl leuco Auramine, N-2,4,5-trichlorophenyl leuco Auramine, Rhodamine-B-anilinolactam, Rhodamine-(p-nitroanilino)lactam, Rhodamine-B-(p-chloroanilino)lactam, 3-dimethylamino-y-methoxyfluoran, 3-diethylamino-7-methoxyfluoran, 3-diethylamino-7-(acetylmethylamino)fluoran, 3-diethylamino-7-(dibenzylamino)fluoran, 3-diethylamino-7-(methylbenzylamino)fluoran, 3-diethylamino-7-(chloroethylmethylamino)fluoran, 3-diethylamino-7-(diethylamino)fluoran, 3-methyl-spiro-dinaphthopyran, 3,3'-dichloro-spiro-dinaphthopyran, 3-benzyl-spiro-dinaphthopyran, 3-methyl-naphtho-(3-methoxybenzo)-spiropyran, 3-propyl-spirodibenzoidipyran, and combinations thereof.

109. The recording medium of claim 101 wherein the infrared sensitive dyes cyanine dyes represented by the following formula (XX);

(XX)



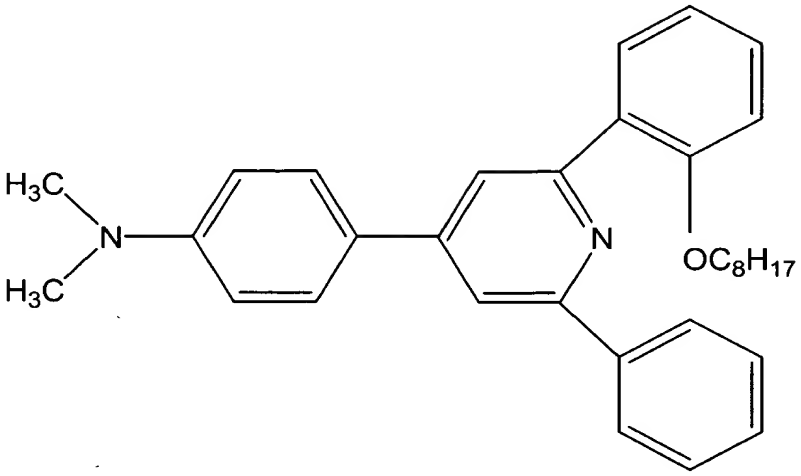
wherein n is 0, 1, 2 or 3; R5 represents an alkyl group; and Y represents CH=CH, N-CH3, C(CH3)2, O, S or Se.

110. The recording medium of claim 101 wherein the infrared sensitive dyes comprise a compound having at least one of a lactone, lactam, sulfone, spiropyran, ester, and amide structure.

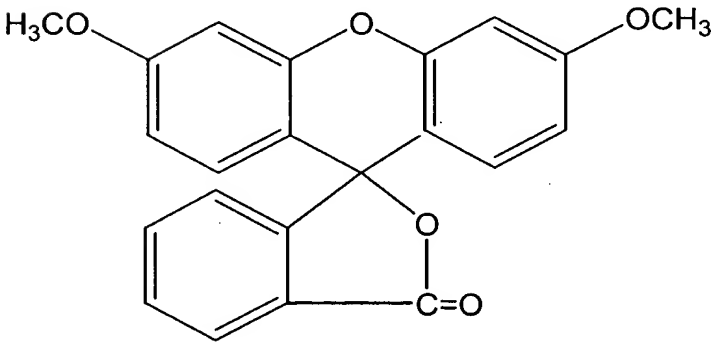
111. The recording medium of claim 110 wherein the infrared sensitive dyes are selected from the group consisting of triarylmethane compounds, bisphenyl methane compounds, xanthene compounds, fluoran compounds, thiazine compounds and spiropyran compounds.

112. The recording medium of claim 101 wherein the infrared sensitive dyes are yellow dyes selected from the group consisting of

(XXI)

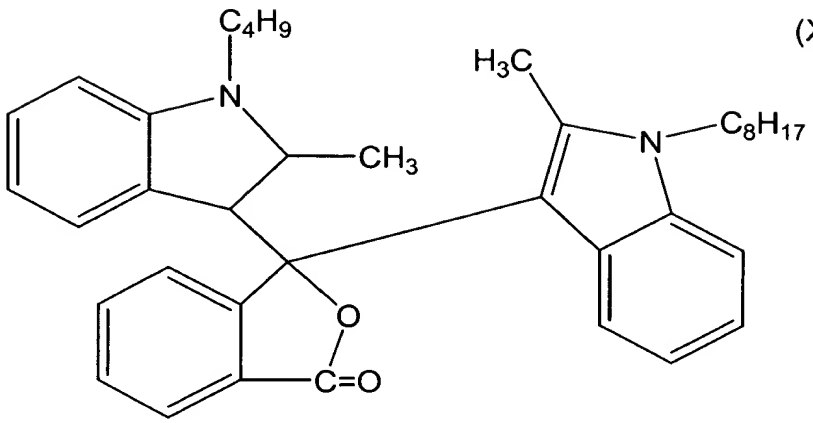


(XXII)

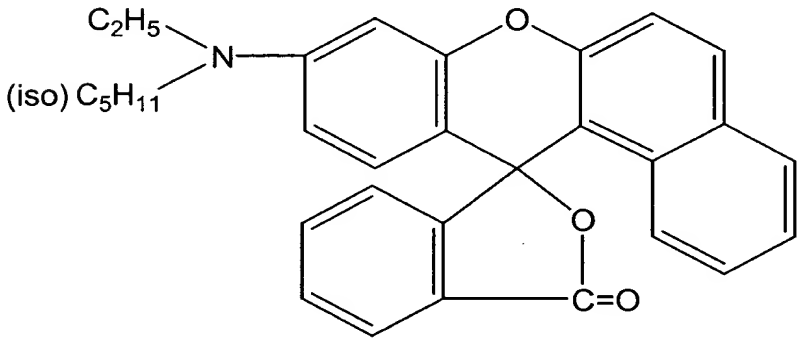


113. The recording medium of claim 101 wherein the infrared sensitive dyes are Magenta dyes selected from the group consisting of

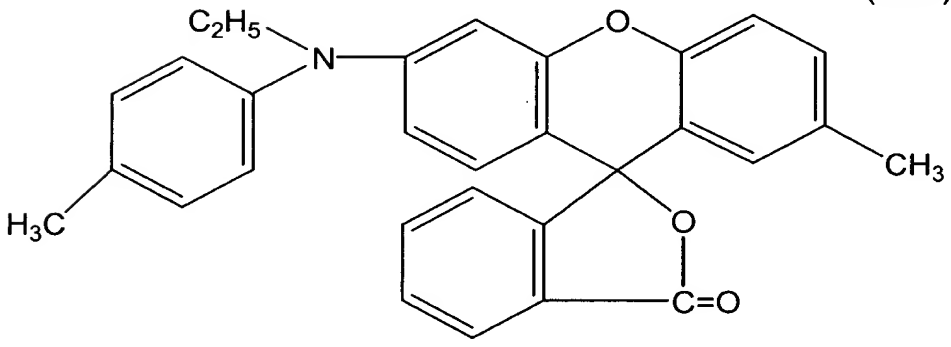
(XXIII)



(XXIV)

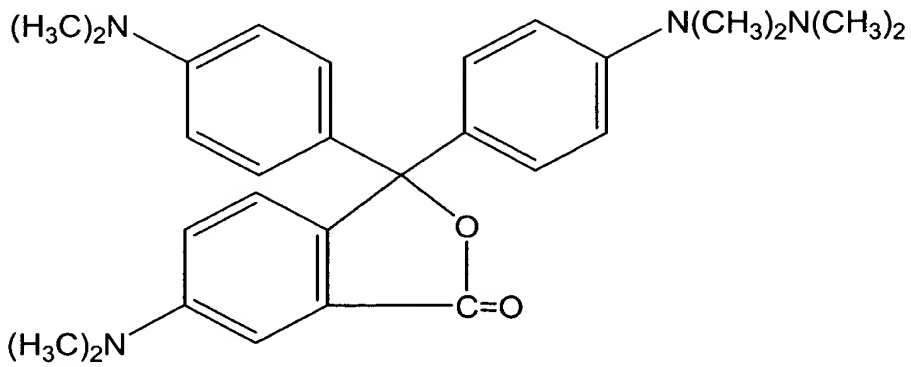


(XXV)



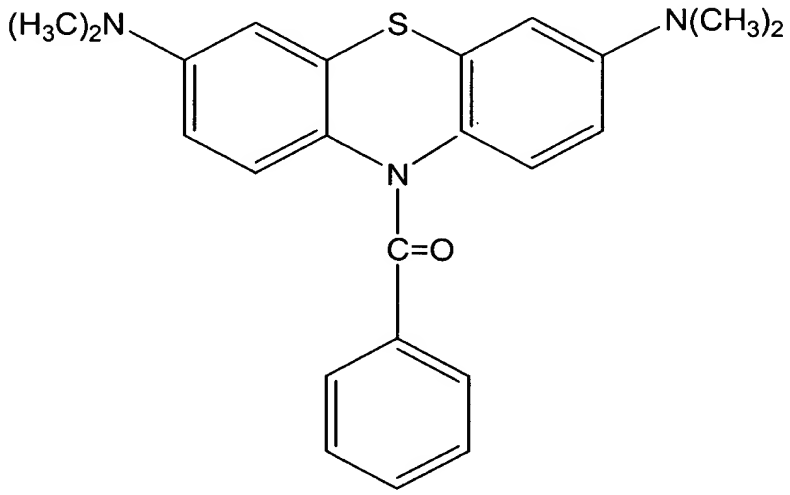
114. The recording medium of claim 101 wherein the infrared sensitive dyes are cyan dyes selected from the group consisting of

(XXVI)



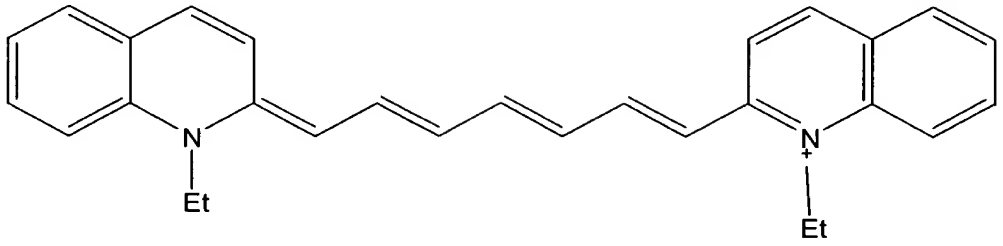
A1 cont'd

(XXVII)



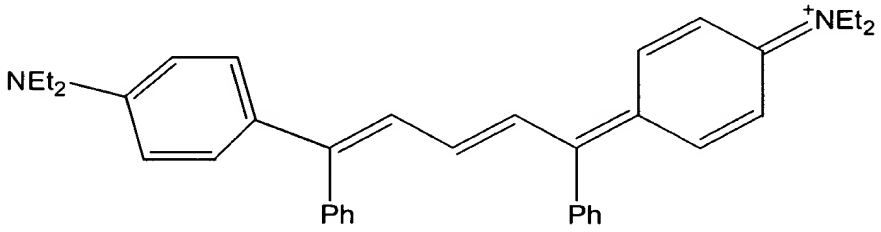
115. The recording medium of claim 101 wherein the infrared sensitive dyes are selected from the group consisting of

(XXVIII)



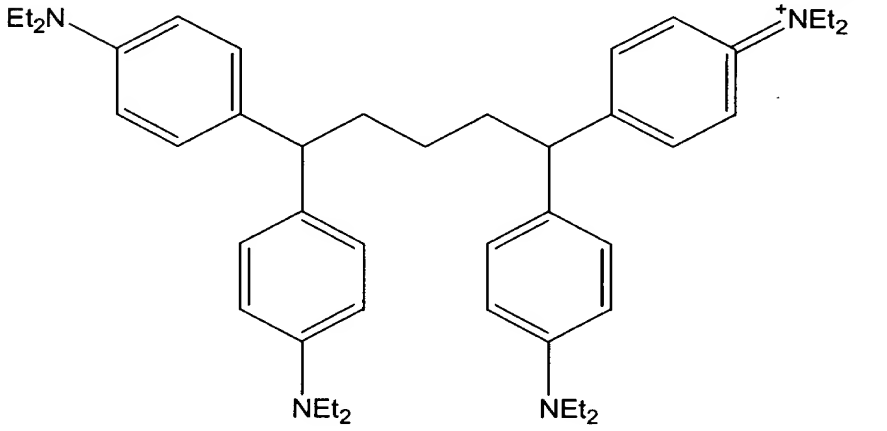
$Et=C_2H_5$

(XXIX)



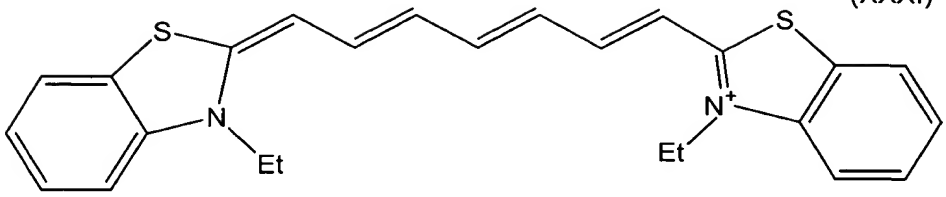
Ph=phenyl

(XXX)

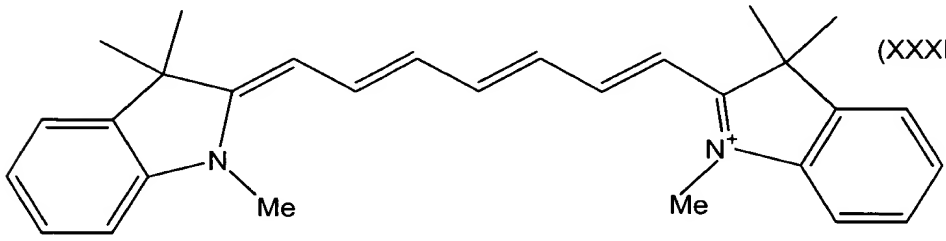


[10011728]

(XXXI)



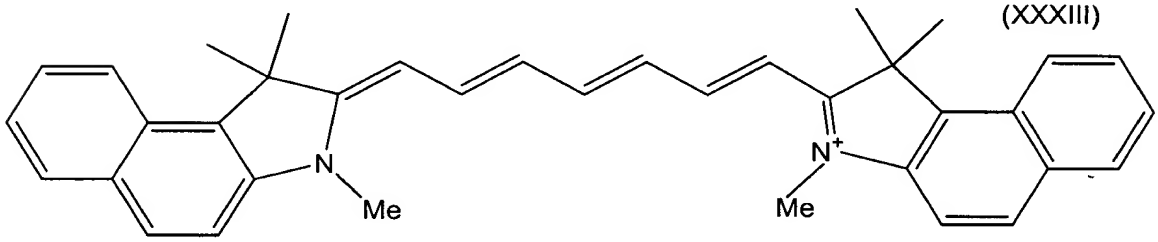
(XXXII)



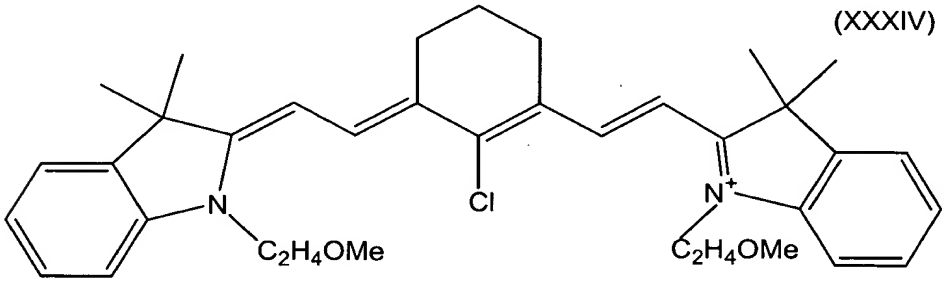
Me=CH_3

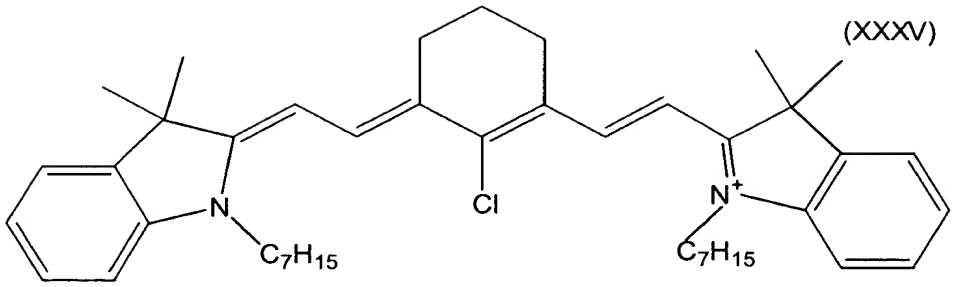
A1
CONT'D

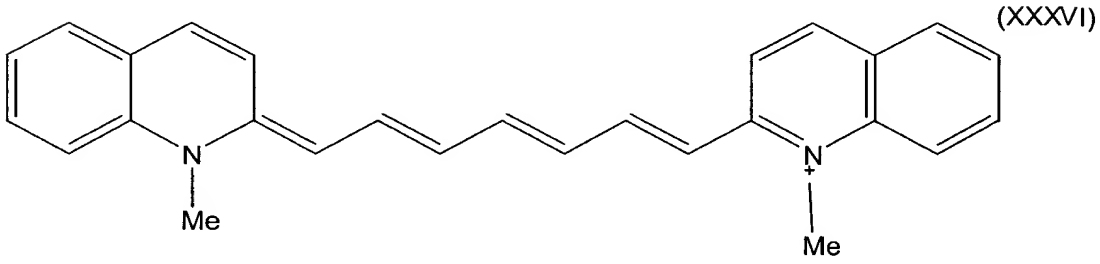
(XXXIII)

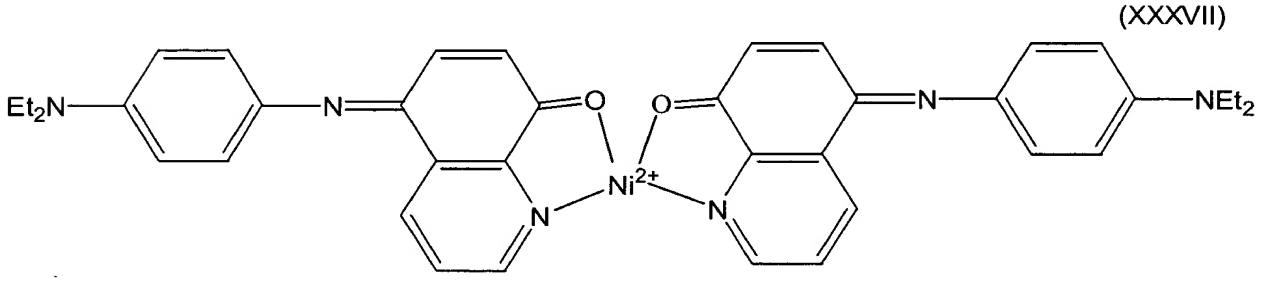


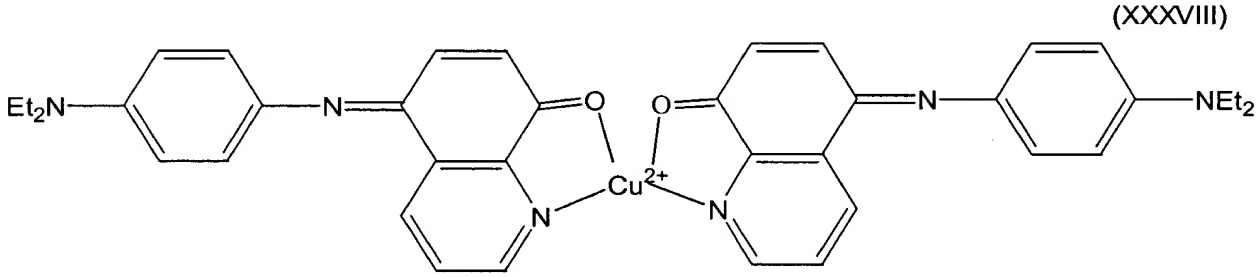
(XXXIV)




(XXXV)
N
C7H15
Cl
N+
C7H15

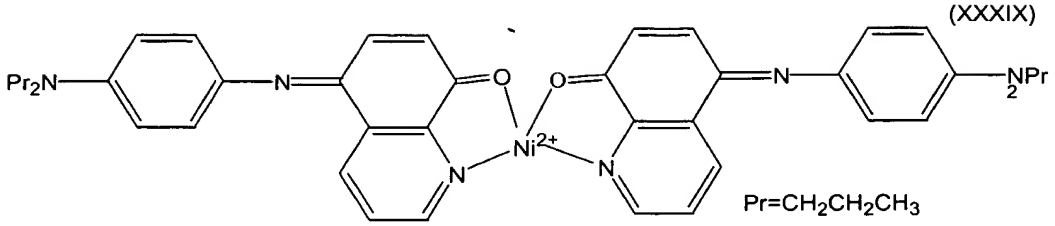

(XXXVI)
N
Me
N+
Me


(XXXVII)
Et2N
N
O
O
N
NEt2
N
Ni2+
N


(XXXVIII)
Et2N
N
O
O
N
NEt2
N
Cu2+
N

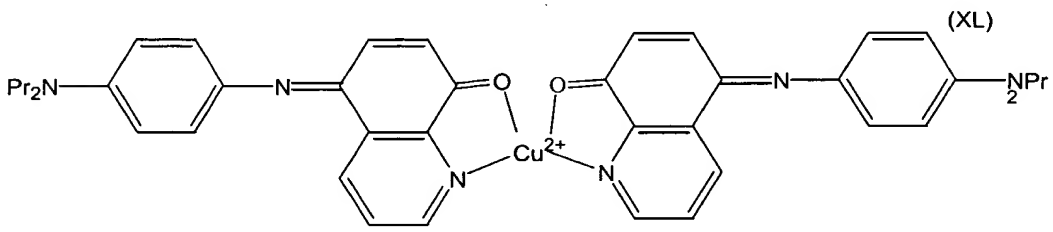
[10011728]

(XXXIX)



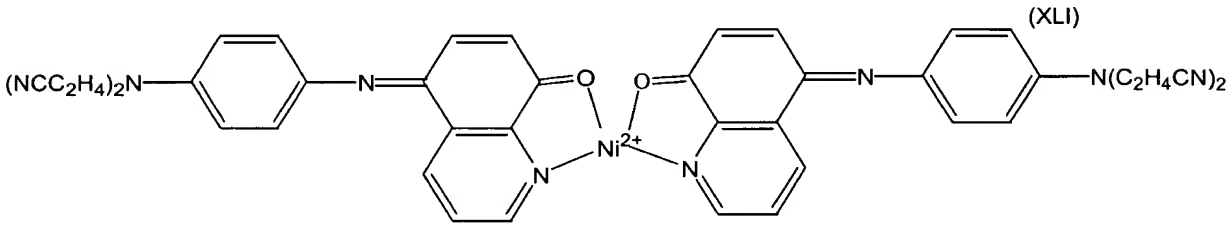
Pr=$CH_2CH_2CH_3$

(XL)

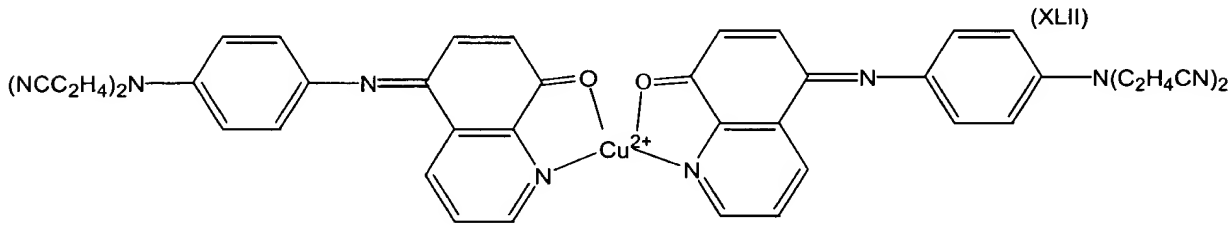


A1 Contd

(XLI)

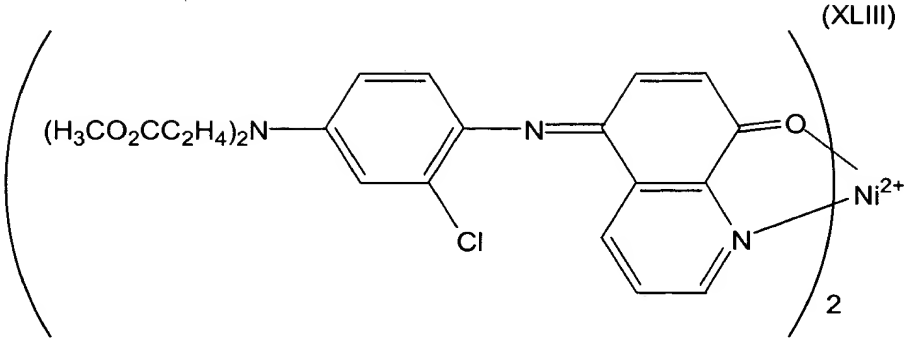


(XLII)

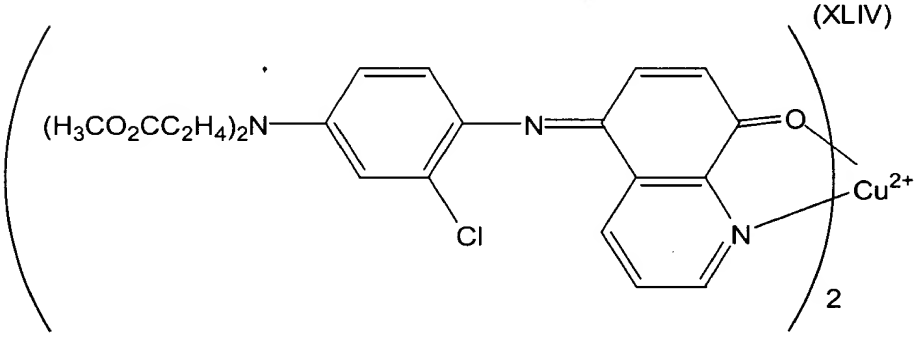


[10011728]

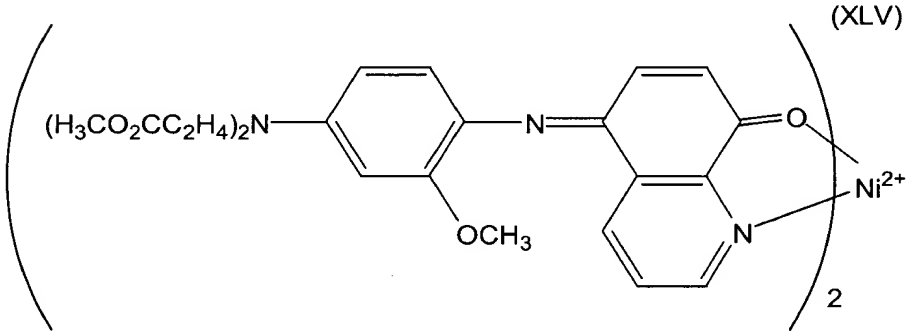
(XLIII)



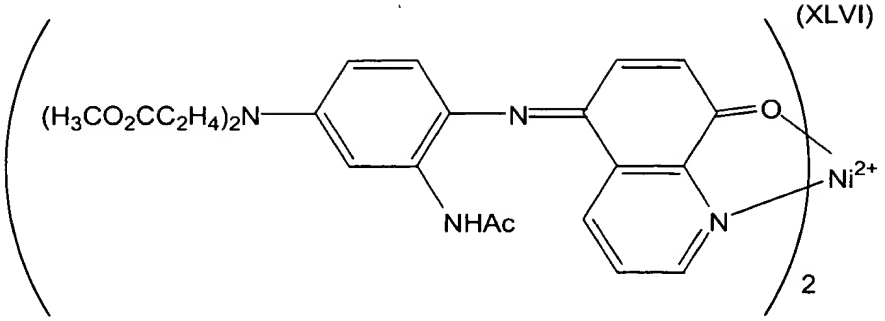
(XLIV)



(XLV)

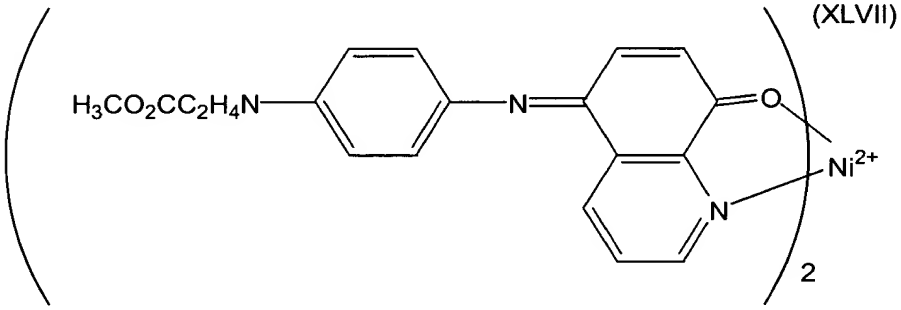


(XLVI)

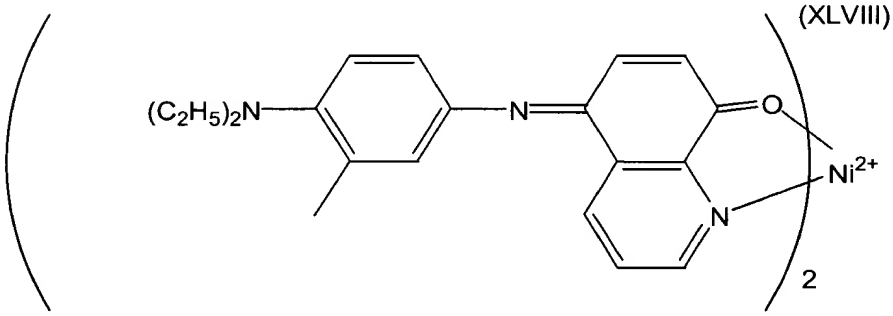


Ac =$COCH_3$

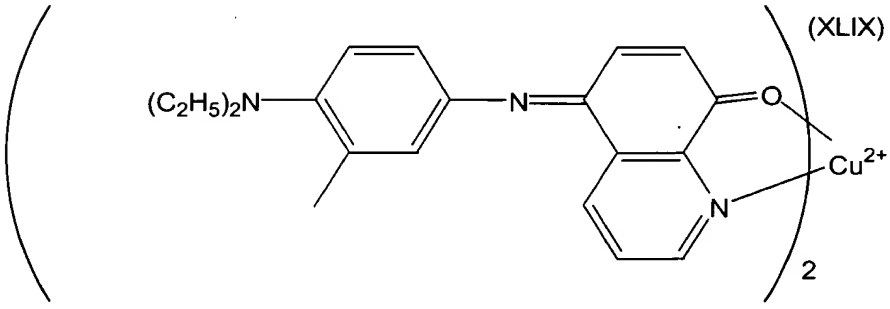
(XLVII)



(XLVIII)

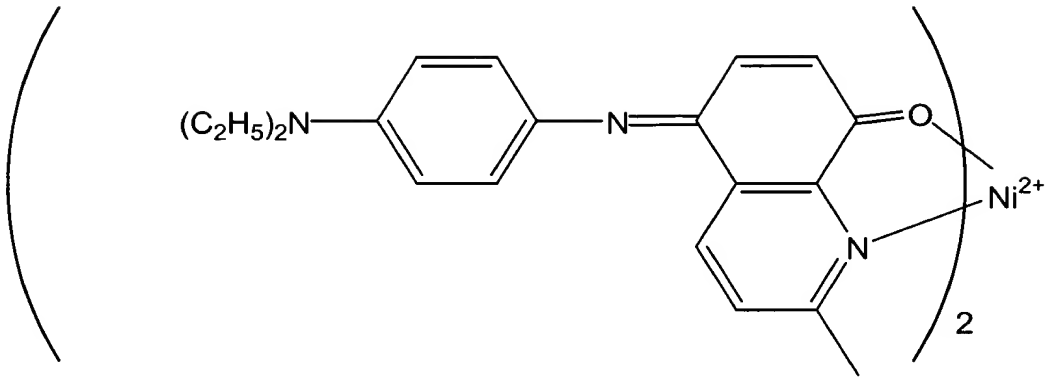


(XLIX)

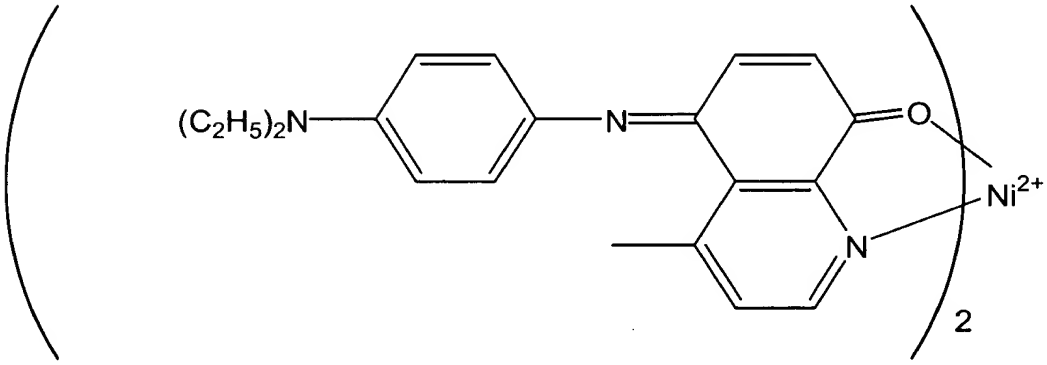


[10011728]

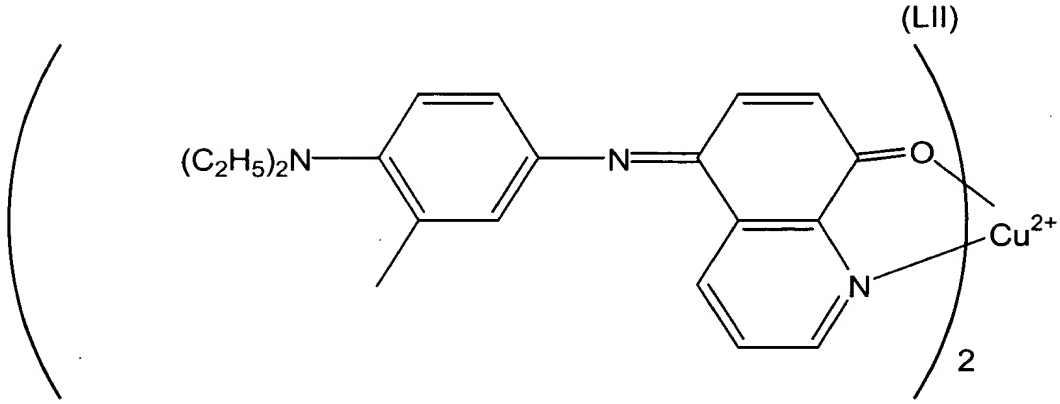
(L)



(LI)



(LII)



116. The recording medium of claim 101 wherein the heat sensitive dyes comprises Basic Green 4; Solvent Yellow 56; Chemithermal CFBK90; Chemithermal CFBK120; Chemithermal CFBE90; Chemithermal CFBE120; Permanent Temp Tell Yellow Ink; Permanent Temp Tell Red Ink; Permanent Temp Tell Blue Ink; Permanent Temp Tell Green Ink; Permanent Temp Tell Orange Ink; Permanent Temp Tell Purple Ink; and Permanent Temp Tell Black Ink.

117. The recording medium of claim 101 wherein the heat sensitive dyes are leuco dyes selected from the group consisting of:
aminotriarylmethanes; aminoxanthenes; aminothioxanthenes; amino-9,10-dihydroacridines; aminophenoxazines; aminophenothiazines; aminodihydrophenazines; aminodiphenylmethanes; leuco indamines; aminohydrocinnamic acids (cyanoethanes, leuco methines) and corresponding esters; hydrozines; leuco indigoid dyes; amino-2,3-dihydroanthraquinones; tetrahalo-p,p'-biphenols; 2(p-hydroxyphenyl)-4,5-diphenylimidazoles; phenethylanilines; indanones and combinations thereof.

118. The recording medium of claim 115 wherein the leuco dyes are selected from the group consisting of aminotriarylmethanes, aminoxanthenes, and leucoindigoid dyes.

119. The recording medium according to claim 118, the leuco dyes being aminotriarylmethanes wherein two of the aryl groups are phenyl groups having an R1R2N-substituent in the position para to the bond to the methane carbon atom and wherein each of R1 and R2 are independently selected from hydrogen, C1-C10 alkyl, 2-hydroxyethyl, 2-cyanoethyl, and benzyl and wherein the third aryl group is selected from:

a) phenyl which can be substituted with lower alkyl, lower alkoxy, chloro, diphenylamino, cyano, nitro, hydroxy, fluoro or bromo;

b) naphthyl which can be substituted with amino, di-lower alkylamino, alkylamino;

c) pyridyl which can be substituted with alkyl;

d) quinolyl;

e) indolinylidene which can be substituted with alkyl.

120. The recording medium according to claim 119, wherein R1 and R2 are selected from hydrogen and alkyl of 1-4 carbon atoms.

121. The recording medium according to claim 118 wherein the aminotriarylmethanes are selected from tris(N,N-dimethylaminophenyl)methane (LCV); deutero-tris(N,N-dimethylaminophenyl)methane (D-LCV); tris(N,N-diethylaminophenyl)methane(LECV); deutero-tris(4-diethylaminolphenyl)methane (D-LECV); tris(N,N-di-n-propylaminophenyl)methane (LPCV); tris(N,N-din-butylaminophenyl)methane (LBCV);

bis(4-diethylaminophenyl)-(4-diethylamino-2-methyl-phenyl)methane (LV-1); bis(4-diethylamino-2-methylphenyl)-(4-diethylamino-phenyl)methane (LV-2); tris(4-diethylamino-2-methylphenyl)methane (LV-3); deutero-bis(4-diethylaminophenyl)-(4-diethylamino-2-methylphenyl)methane (D-LV-1); deutero-bis(4-diethylamino-2-methylphenyl)(4-diethylaminophenyl)methane (D-LV-2); bis(4-diethylamino-2-methylphenyl)(3,4-dimethoxyphenyl)methane (LB-8);

122. The recording medium of claim 121 wherein the aminotriarylmethane leuco dyes have alkyl substituents selected from C1-C4 alkyl, the substituents bonded to the amino moieties.

123. The recording medium of claim 122 wherein the aminotriaryl methane leuco dyes are further substituted with one or more alkyl groups on the aryl rings, the alkyl groups being independently selected from C1-C3 alkyl.

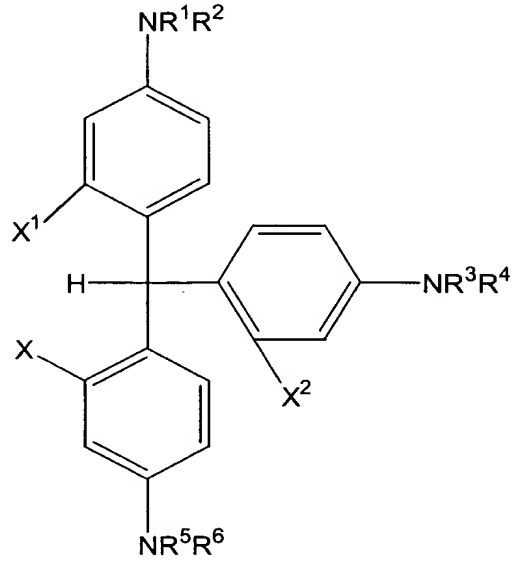
124. The recording medium of claim 121 wherein the amino triarylmethane leuco dyes are selected from the group consisting of: D-LECV, LV-1, LV-2, D-LV-1, and D-LV-2.

125. The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is selected from LV-1 and LV-2.

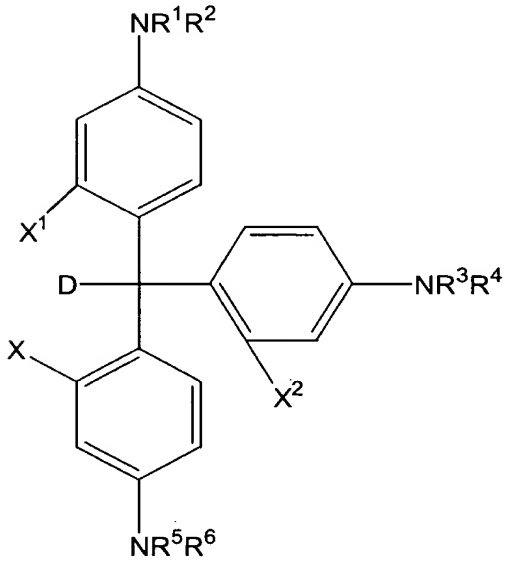
126. The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is Trans-3-hydroxy-2-(p-diethylaminobenzyl)indanone (LY-1).

127. The recording medium of claim 124 wherein at least one of the aminotriarylmethane leuco dyes is Benzo((a)-6-N,N-diethylamino-9-(2-methoxycarbonyl)-phenylxanthene (LM-5).

128. The recording medium of claim 124 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures I and II:



I



II

wherein I and II have components X, X_1, $X_2$and R_1 through R_6 selected from a) through g):

a) X, X^1 and X^2 are H; R^1 through R^6 are H.

b) X, X^1 and X^2 are H; R^1 through R^6 are CH_3.

c) X, X^1 and X^2 are H; R^1 through R^6 are C_2H_5.

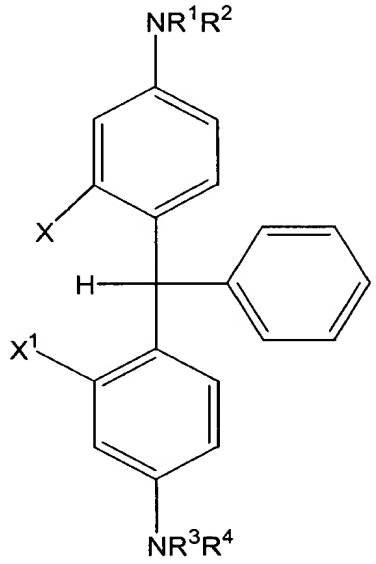
d) X, X^1 and X^2 are H; R^1 through R^6 are independently selected from H and C3-8 alkyl.

e) X and X^1 are H; X^2 is CH_3; R^1 through R^6 are independently selected from H and C1-C8 alkyl.

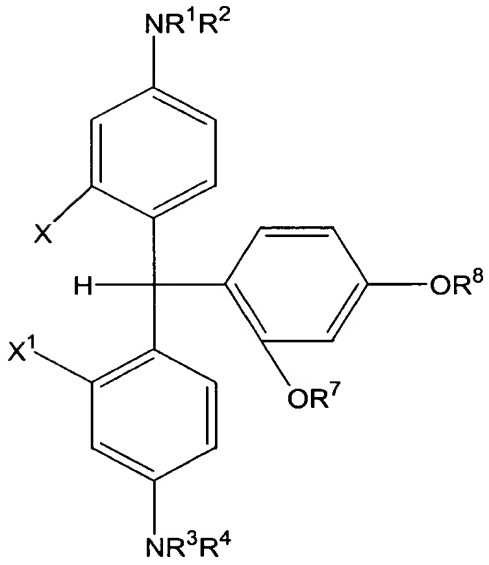
f) X is H; X^1 and X^2 are CH_3; R^1 through R^6 are independently selected from H and C1-C8 alkyl.

g) X, X^1 and X^2 are H; R^1, R^3 and R^5 are independently selected from aryl C6-C10; substituted C6-C10 aryl; and R^2, R^4, and R^6 are H.

129. The recording medium of claim 122 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures III through VI:

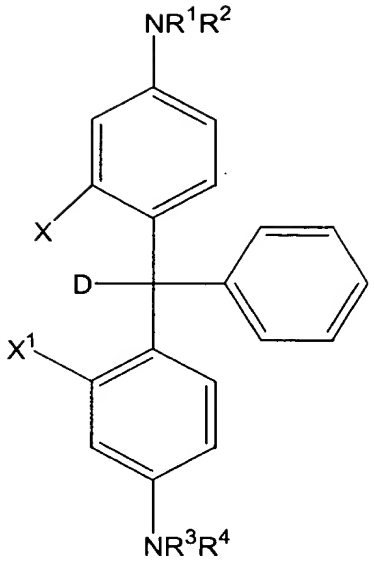


III

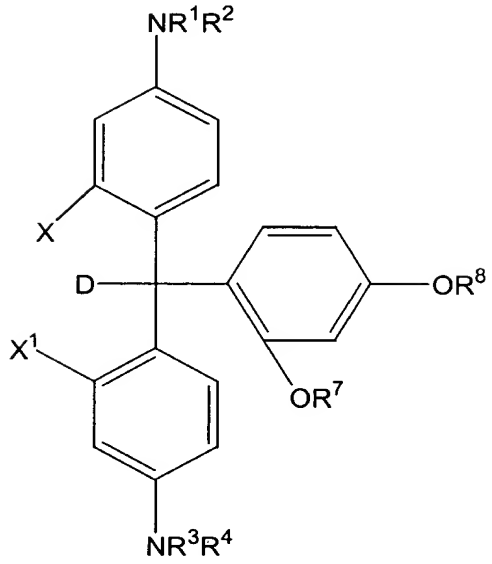


IV

[10011728]



V



VI

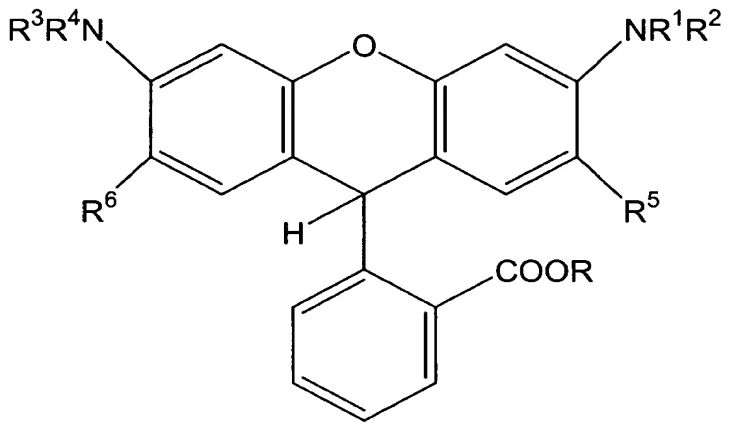
wherein III through VI have components X, X1, X2 and R1 through R6 selected from a) through c):

a) X and X^1 are H; and R^1 through R^4 are independently selected from H and C1-C8 alkyl

b) X and X^1 are H and R^1 and R^3 are aryl; and R^2 and R^4 are H

c) X = CH_3, X^1 = H and R^1 through R^4 are independently selected from H and C1-C8 alkyl; and R^7 and R^8 are independently selected from C1-C8 alkyl, or R^7 and R^8 are bridged to form a cyclic attachment with a CH_2- or C_2H_4- bond, thereby forming a five- or six-membered ring, respectively.

130. The recording medium of claim 124 wherein the aminotriarylmethaneleuco dyes comprise chemical structure VII:



wherein R is independently selected from H, C1-C8 alkyl; R^5 and R^6 are independently selected from H and C1-C4 alkyl; R^1 through R^4 are independently selected from H and C1-C6 alkyl, C6-C10 aryl with the proviso that, if R^1 and R^3 are aryl, then R^2 and R^4 are hydrogen.

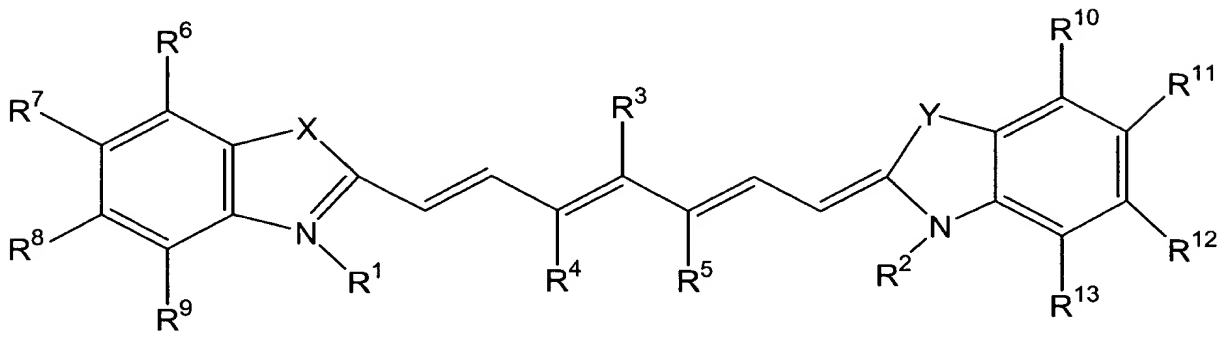
131. The recording medium of claim 118 wherein the leuco dyes comprise at least one of aminotriarylmethanes and aminoxanthenes.

132. The recording medium of claim 103 wherein the heat sensitive dyes are near IR-absorbing dyes comprising at least one of
1) DF-1: 2-((2-((2-chloro-3-(((1,3-dihydro-1,3,3-trimethyl-2H-indol-2-ylidene)ethylidene)-1-cyclopenten-1-yl)ethenyl)-1,3,3-trimethyl-3H-indolium trifluoromethanesulfonate;
2) RD-1: Cyasorb® IR-165 Near IR Dye(absorption maximum at 1070 nm); and
3) SQS 4((((3-((((2,6-bis(1,10-dimethylethyl)-4H-thiopyrann-4-ylidene)methyl)-2-methyl)2-hydroxy-4-oxo-2-cyclobuten-1-ylidene)methyl-2,6-bis(1,1-dimethylethyl)thiopyrilium hydroxide, inner salt,

133. The recording medium of claim 132 wherein the heat sensitive dyes are near IR absorbing dyes comprising at least one of DF-1 and RD-1.

134. The recording medium of claim 133 wherein the heat sensitive dyes are near IR absorbing dyes comprising DF-1.

135. The recording medium of claim 101 wherein the heat sensitive dyes comprise Heptamethine cyanine dyes having a chemical structure (VIII) as shown below:

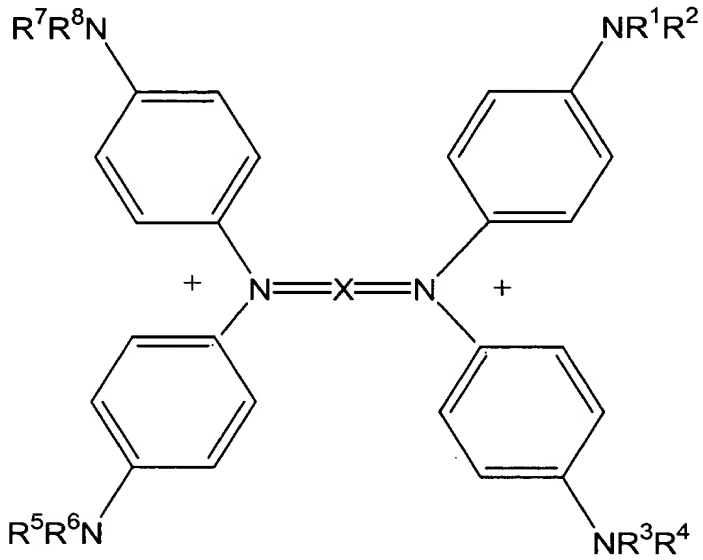


(VI

where R3 can be H, halogen, alkyl, aryl, aryl, alkoxy, aryloxy, thioalkyl, or thioaryl; R4 and R5 are independently selected from H, alkyl, aryl, or are bridged to form a cyclic attachment; each of R6 through R13 is independently selected from H, alkyl, aryl, or any two adjacent R6 through R9 and any two adjacent R10 through R13 can form R10 through R13 can form a fused aryl; each of R1 and R2 are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R' where R', R" are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R" where R', R" are independently selected from H, C1-C6 alkyl, O, S, Se and Te.

136. The recording medium of claim 101 wherein the heat sensitive dyes comprise Benzenaminium dyes having structure (IX) as shown below:

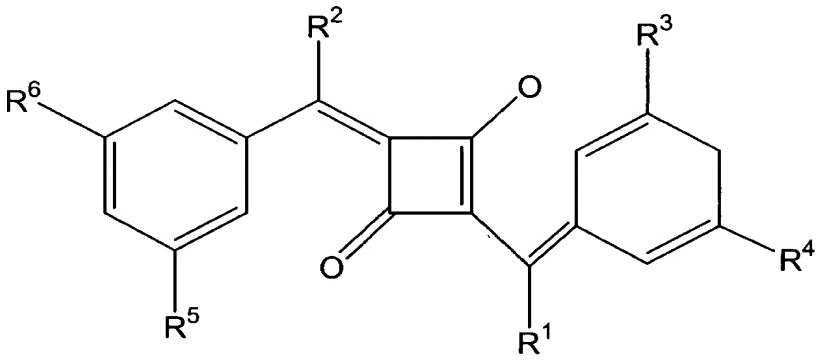
(IX)

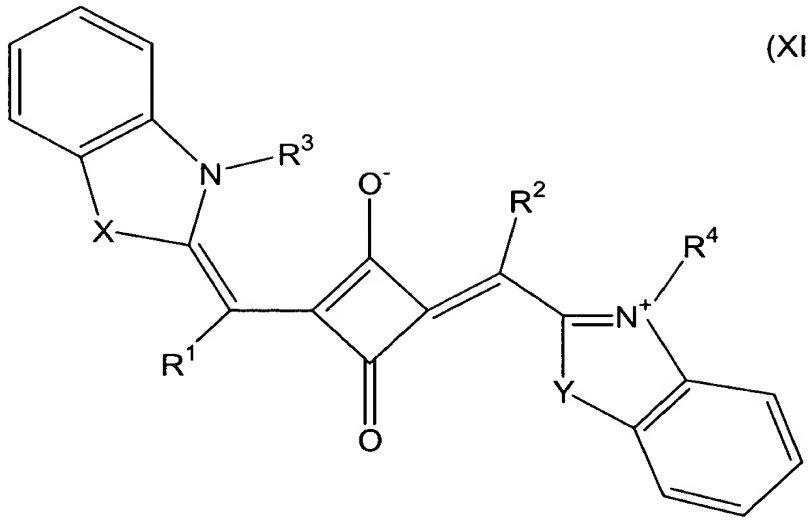


wherein each of R^1 through R^8 is independently selected from C1-C6 alkyl; X is a substituted 1,4-cyclohexadiene.

137. The recording medium of claim 101 wherein the heat sensitive dyes are near IR-absorbing dyes having structure (X) or structure (XI) as shown below:

(X)



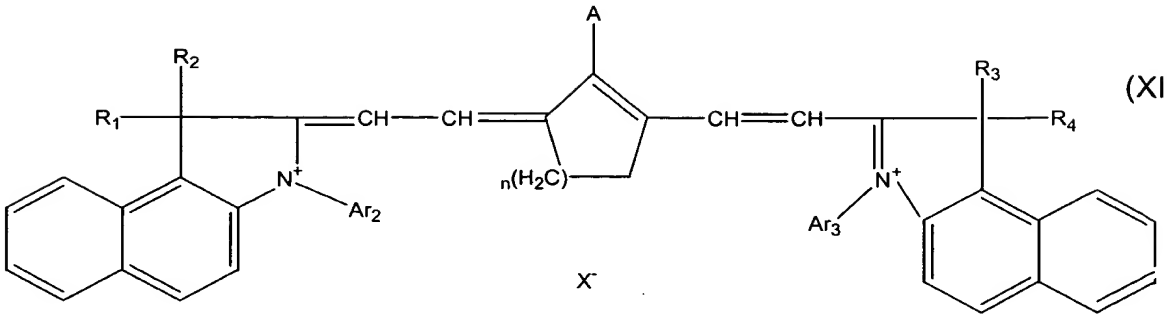


(XI)

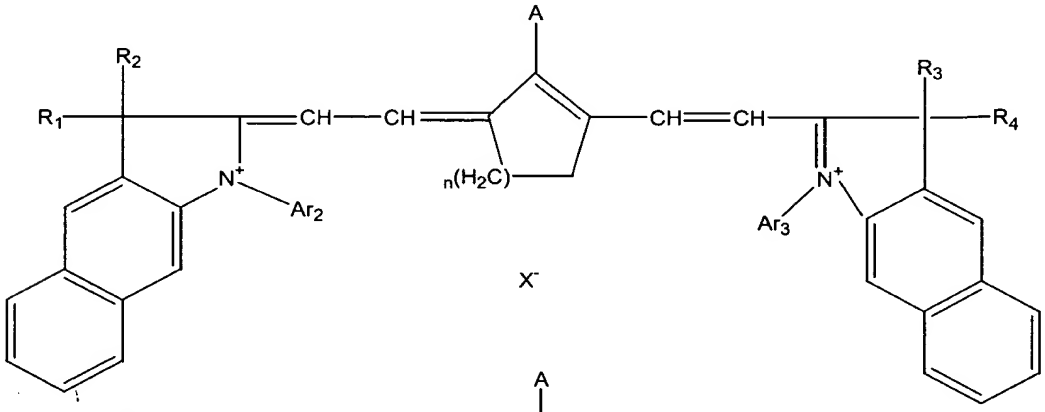
wherein each of R1 through R6 is independently selected from H, C1-C6 alkyl; X and Y are independently selected from O, S, Se, Te, N-R7, wherein R7 is selected from C1-C6 alkyl and

wherein each of R1 and R2 is independently selected from H, C1-C6 alkyl; each of X and Y is independently selected from O, S, Se, Te, N—R7,wherein R7 is selected from C1-C6 alkyl; each R3 and R4 is independently selected from alkyl, aryl or substituted alkyl and wherein the benzene rings in structure (XI) may be further substituted.

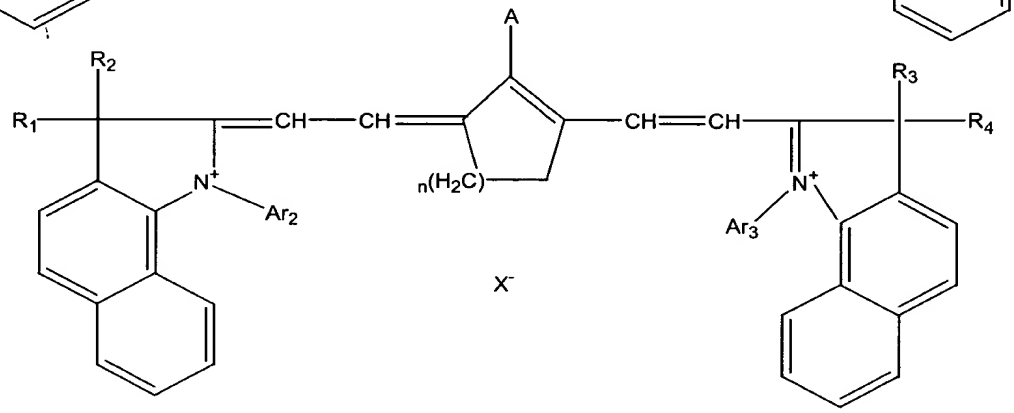
138. The recording medium of claim 101 wherein the heat sensitive dyes are near IR-absorbing dyes selected from the group consisting of:



(XII)



(XIII)



(XIV)

wherein R1-R4 are independently substituted or unsubstituted C1-C6 alkyl; A is substituted or unsubstituted phenyl, naphthyl, C1-C6 alkyl, or C7-C10 aralkyl; Ar2 and Ar3 are independently substituted or unsubstituted phenyl or naphthyl; X is a monovalent anion; and n is 1 or 2.

139. The recording medium of claim 138 wherein the alkyl, aryl or aralkyl substitution groups comprise at least one of: hydroxy, alkoxy, chloro, bromo, cyano, and amino.

140. The recording medium of claim 101 wherein the heat-sensitive dyes are near IR-absorbing dyes selected from the group consisting of: 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-1); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-2); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-3); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-4); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-5); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-6).

141. The recording medium of claim 140 wherein the near IR-absorbing dyes comprise at least one of JC-1 and JC-2.

142. The recording medium of claim 140 wherein the near IR-absorbing dyes comprise JC-1.

143. The recording medium of claim 101 wherein the light sensitive and temperature sensitive dyes are encapsulated in microcapsules, the microcapsules comprising polymers having T_g from 80°C to 200°C.

144. The recording medium of claim 143 wherein the polymers are selected from the group consisting of polyurethanes, acrylates, styrenes and combinations thereof.

145. The recording medium of claim 143 wherein the polymers comprise styrene-butylacrylate-polyethylene glycol acrylate.

146. A method of making a recording medium comprising the step of applying on at least one surface of the recording medium laser sensitive materials selected from at least one of the group consisting of infrared sensitive dyes and heat sensitive dyes.

147. The method of claim 146, wherein the laser sensitive material comprises at least two different dyes, each dye activatable at a different temperature.

148. The method of claim 146, wherein the laser sensitive material comprises at least one dye that is activatable at a first temperature and deactivatable at a second temperature.

149. The method of claim 146 wherein the infrared sensitive dyes comprise 3'phenyl-7-diethylamino-2,2'-spirodi-(2H-1-benzopyran); IR 10000 FBK; IR 10000 FBE; IR 10000 GBK; and IR 10000 GBE.

150. The method of claim 146 wherein the infrared sensitive dyes comprise colorless electron donating type dry precursor compounds which react with a developer compound to generate a dye.

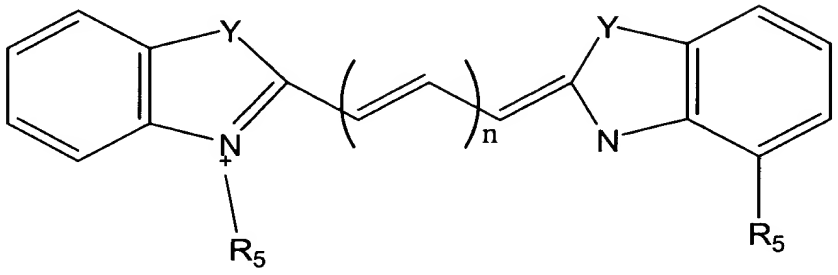
151. The method of claim 150 wherein the colorless electron donating type dry precursor compound has at least one of a lactone, a lactam, a sulfone, a spiropyran, an ester or an amido structure.

152. The method of claim 150 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of triarylmethane compounds, bisphenylmethane compounds, xanthene compounds, xanthene compounds, thiazine compounds, spiropyran compounds and the like.

153. The method of claim 152 wherein the colorless electron donating type dry precursor compound is selected from the group consisting of Crystal Violet lactone, benzoyl leuco methylene blue, Malachite Green Lactone, p-nitrobenzoyl leuco methylene blue, 3-dialkylamino-7-dialkylamino-fluoran, 3-methyl-2,2'-spirobi(benzo-f-chrome), 3,3-bis(p-dimethylaminophenyl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-methylindole-3-yl)phthalide, 3-(p-dimethylaminophenyl)-3-(2-phenylindole-3-yl)phthalide, 3,3-bis(1,2-dimethylindole-3-yl-5-dimethylaminophthalide, 3,3-bis-(1,2-dimethylindole-3-yl)6-dimethylaminophthalide, 3,3-bis-(9-ethylcarbazole-3-yl)-5-dimethylaminophthalide, 3,3-bis(2-phenylindole-3-yl)-5-dimethylaminophthalide, 3-p-dimethylaminophenyl-3-(1-methyl pyrrole-2-yl)-6-dimethylaminophthalide, 4,4'-bis-dimethylaminobenzhydrin benzyl ether, N-halophenyl leuco Auramine, N-2,4,5-trichlorophenyl leuco Auramine, Rhodamine-B-anilinolactam, Rhodamine-(p-nitroanilino)lactam, Rhodamine-B-(p-chloroanilino)lactam, 3-dimethylamino-y-methoxyfluoran, 3-diethylamino-7-methoxyfluoran, 3-diethylamino-7-(acetylmethylamino)fluoran, 3-diethylamino-7-(dibenzylamino)fluoran, 3-diethylamino-7-(methylbenzylamino)fluoran, 3-diethylamino-7-(chloroethylmethylamino)fluoran, 3-diethylamino-7-(diethylamino)fluoran, 3-methyl-spiro-dinaphthopyran, 3,3'-dichloro-spiro-dinaphthopyran, 3-benzyl-spiro-dinaphthopyran, 3-methyl-naphtho-(3-methoxybenzo)-spiropyran, 3-propyl-spirodibenzoidipyran, and combinations thereof.

154. The method of claim 146 wherein the infrared sensitive dyes cyanine dyes represented by the following formula (XX);

(XX)



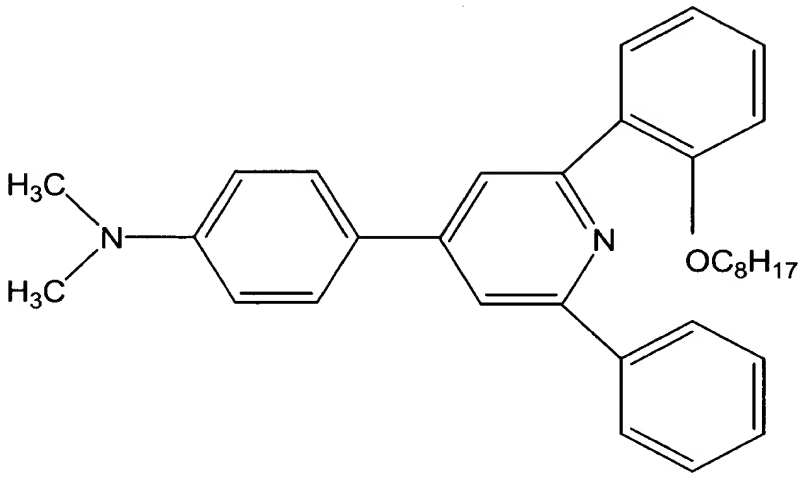
wherein n is 0, 1, 2 or 3; R5 represents an alkyl group; and Y represents CH=CH, N-CH3, C(CH3)2, O, S or Se.

155. The method of claim 146 wherein the infrared sensitive dyes comprise a compound having at least one of a lactone, lactam, sulfone, spiropyran, ester, and amide structure.

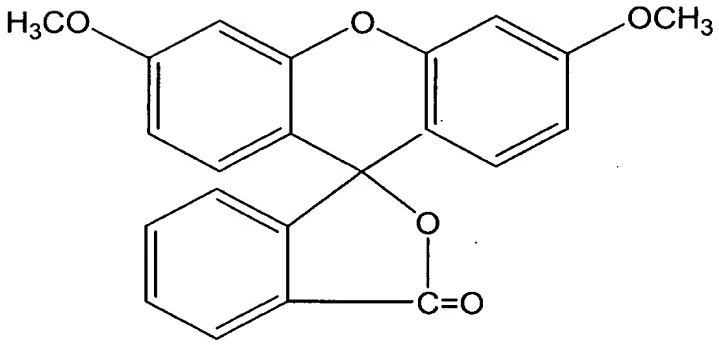
156. The method of claim 155 wherein the infrared sensitive dyes are selected from the group consisting of triarylmethane compounds, bisphenyl methane compounds, xanthene compounds, fluoran compounds, thiazine compounds and spiropyran compounds.

157. The method of claim 146 wherein the infrared sensitive dyes are yellow dyes selected from the group consisting of.

(XXI)

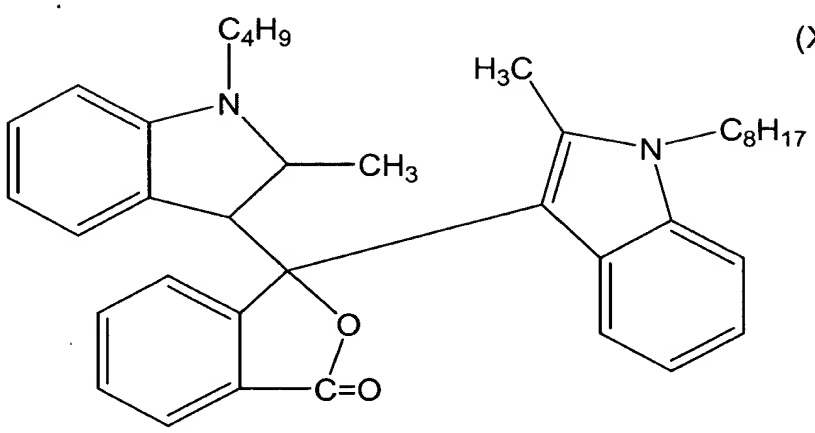


(XXII)

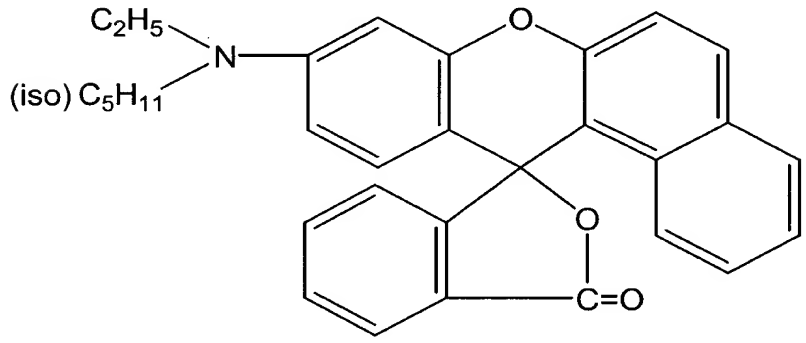


158. The method of claim 146 wherein the infrared sensitive dyes are Magenta dyes selected from the group consisting of

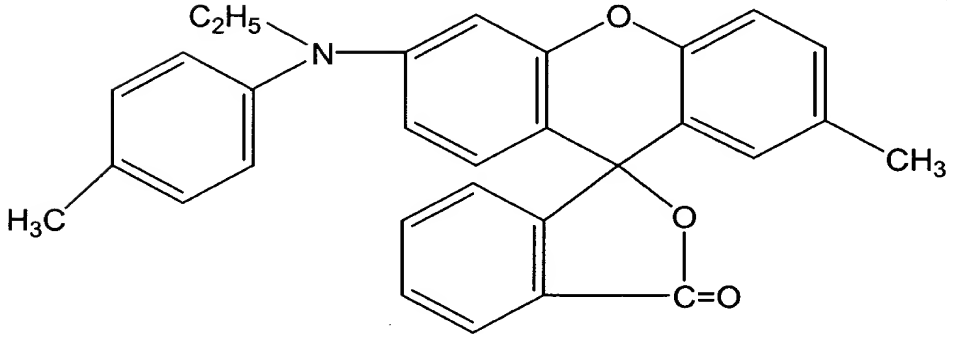
(XXIII)



(XXIV)

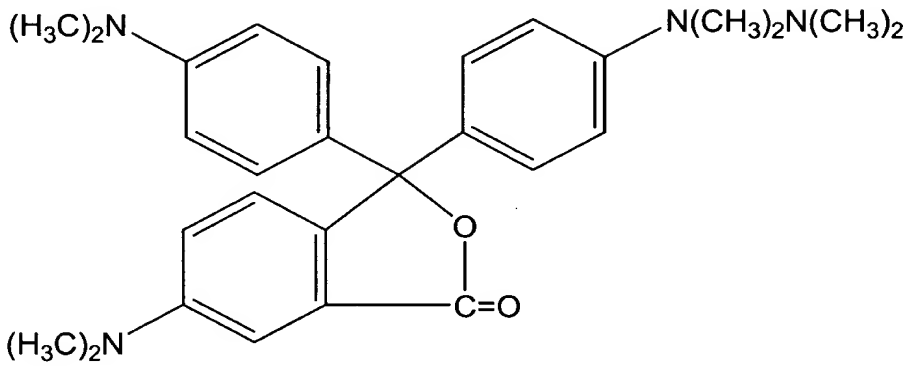


(XXV)

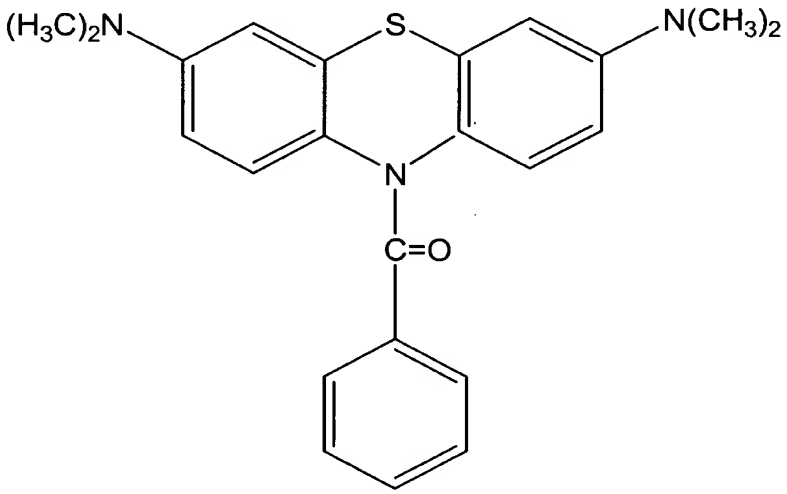


159. The method of claim 146 wherein the infrared sensitive dyes are cyan dyes selected from the group consisting of

(XXVI)



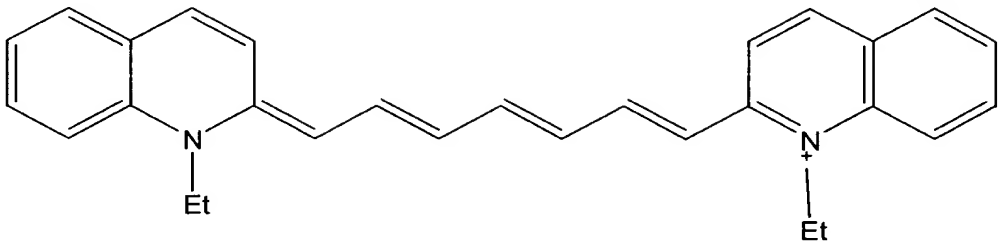
(XXVII)



A1 Cont'd

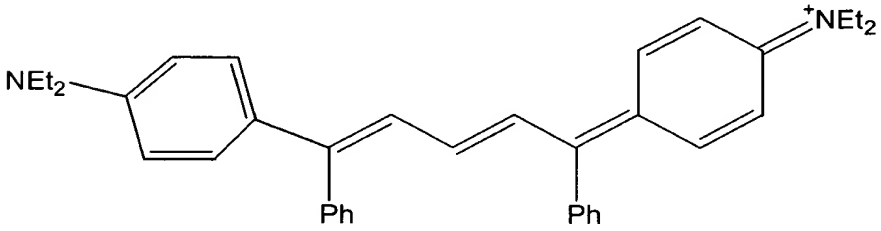
160. The method of claim 146 wherein the infrared sensitive dyes are selected from the group consisting of

(XXVIII)



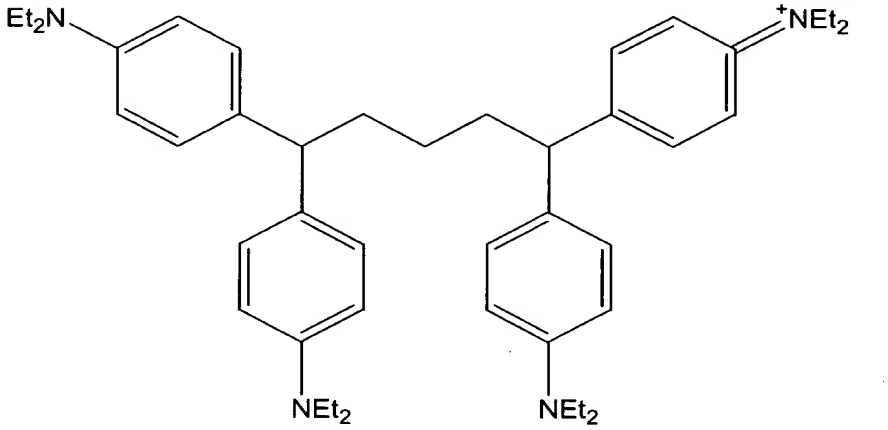
Et=C_2H_5

(XXIX)



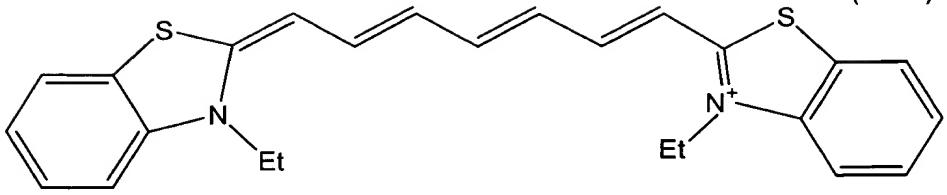
Ph=phenyl

(XXX)



[0011728]

(XXXI)



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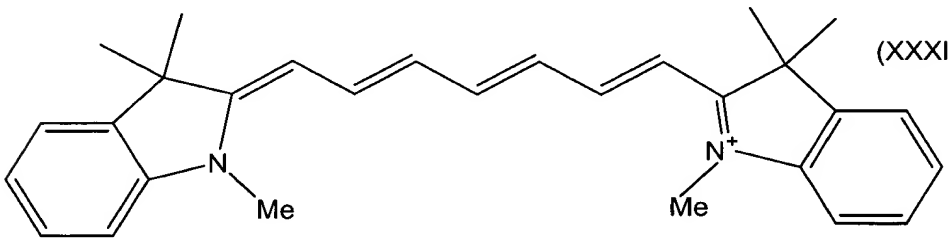
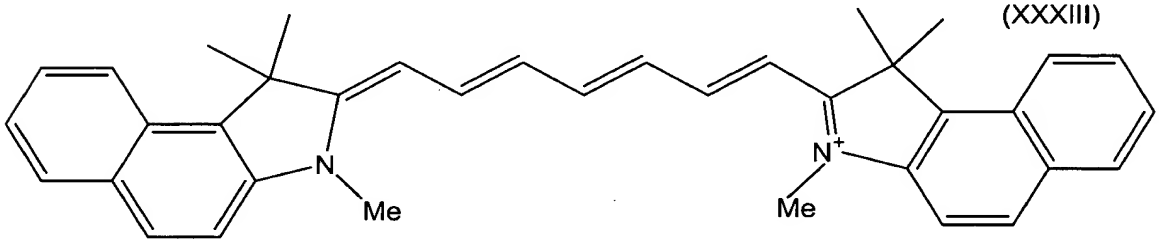


Me=CH_3

A1 Cont'd

(XXXIII)



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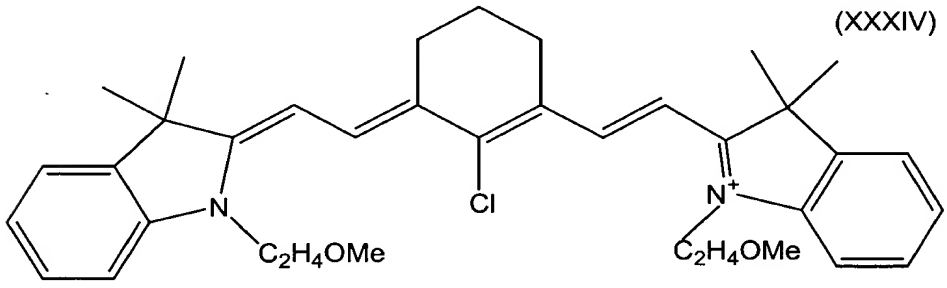

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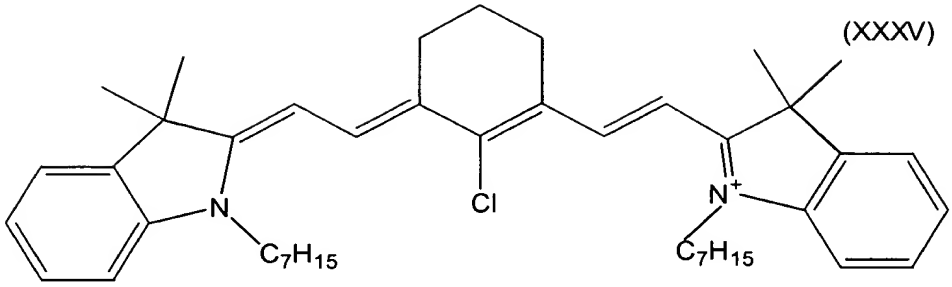

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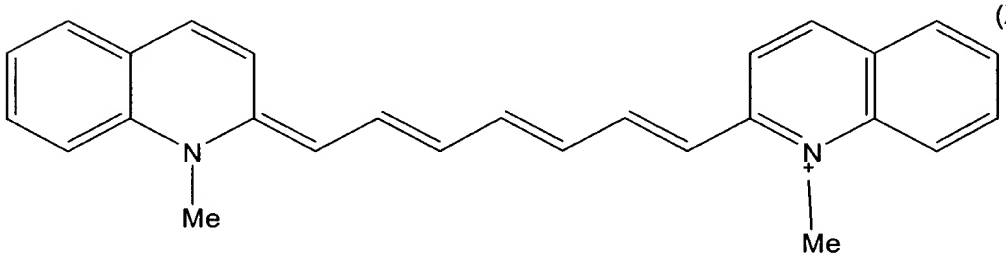

(XXXVI)

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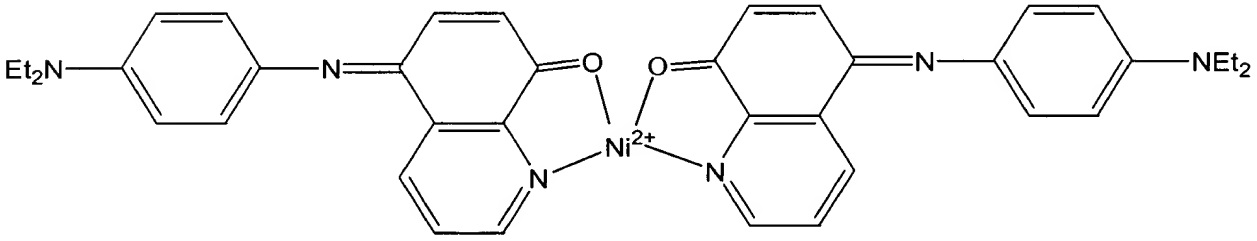

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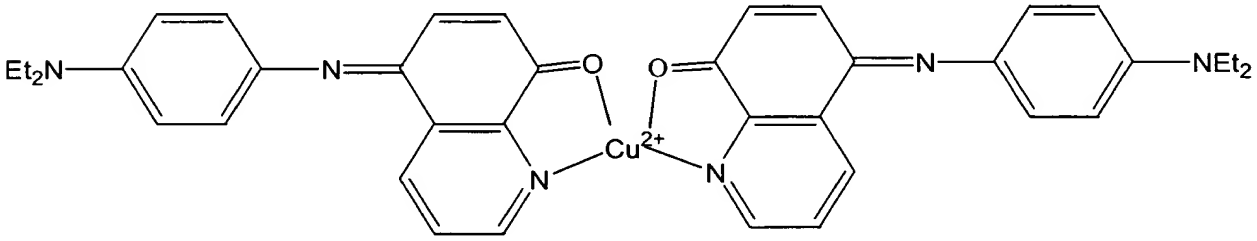
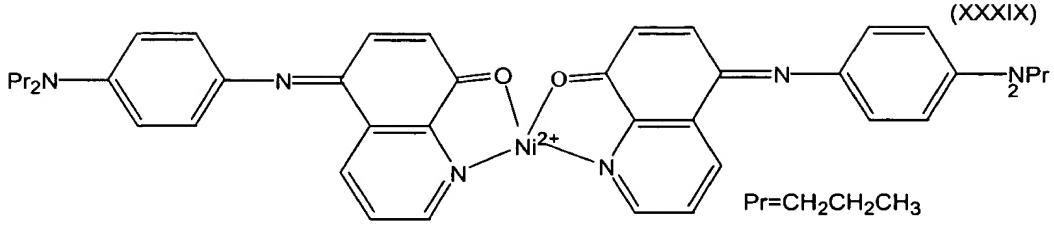


(XXXVIII)

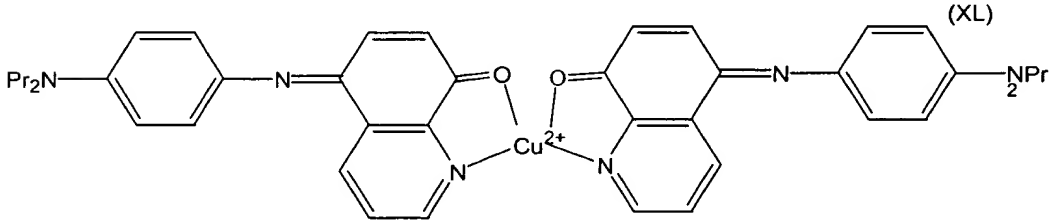
[10011728]

(XXXIX)

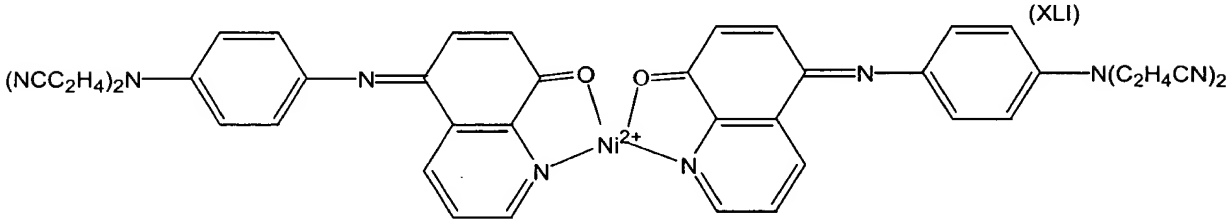


Pr=$CH_2CH_2CH_3$

(XL)



(XLI)



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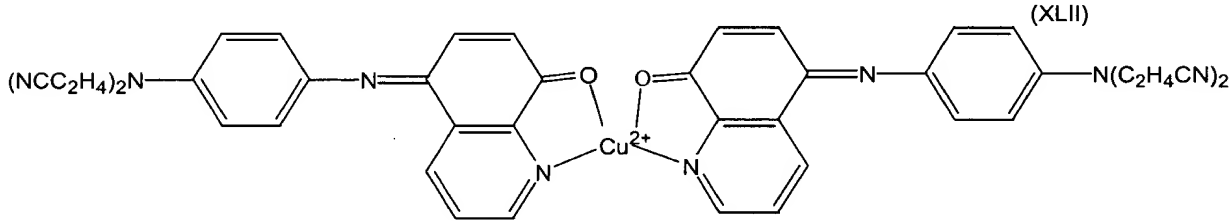
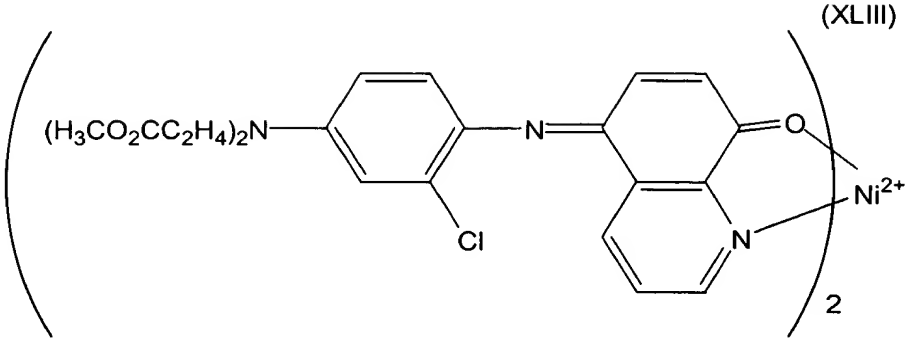
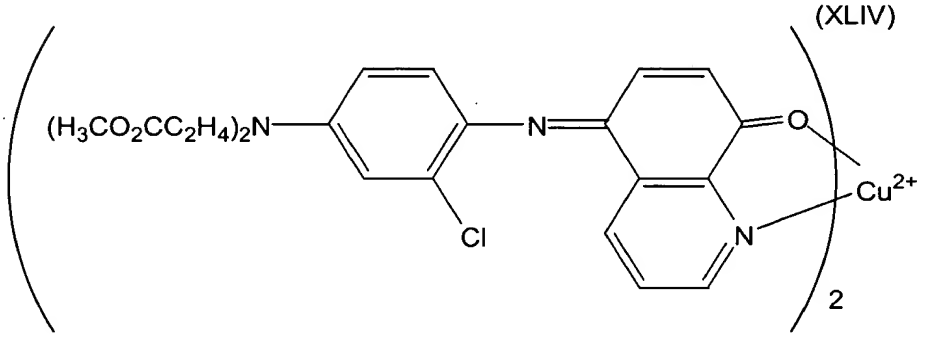


[0011728]

(XLIII)



(XLIV)



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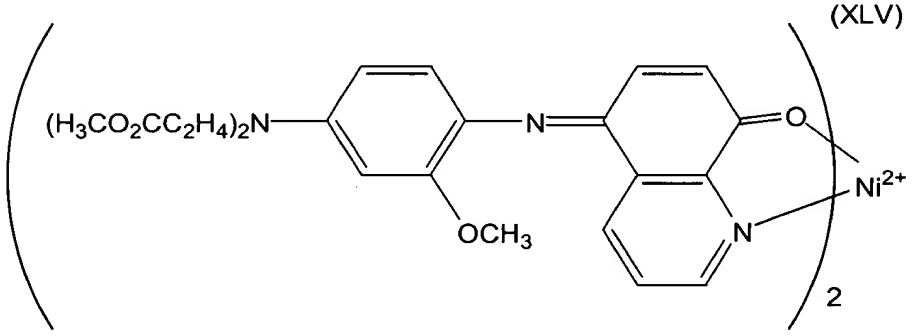

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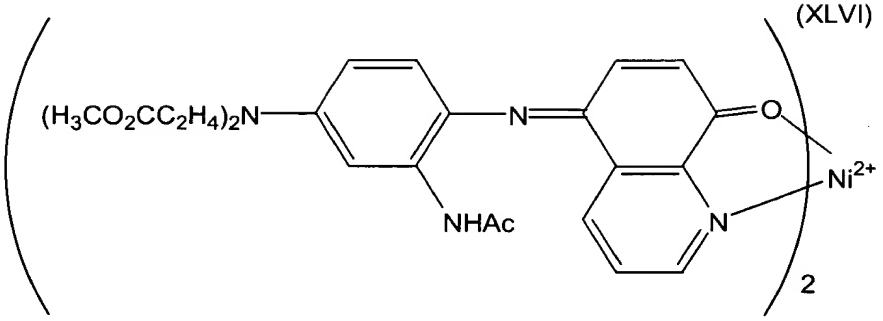
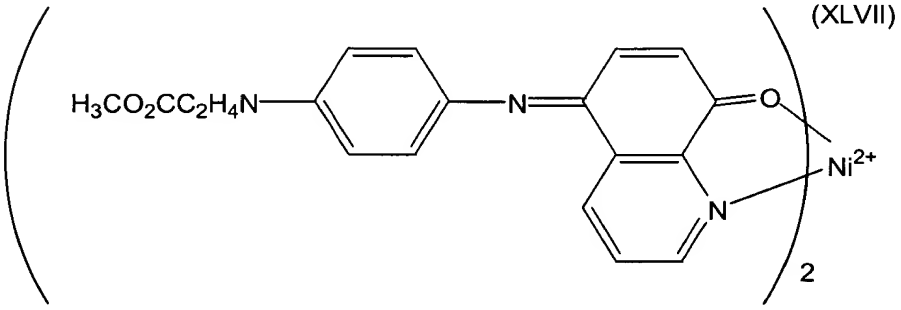


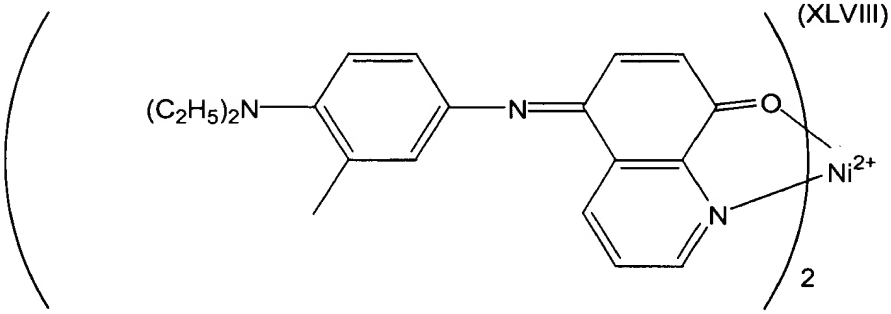
Ac =$COCH_3$

(XLVII)

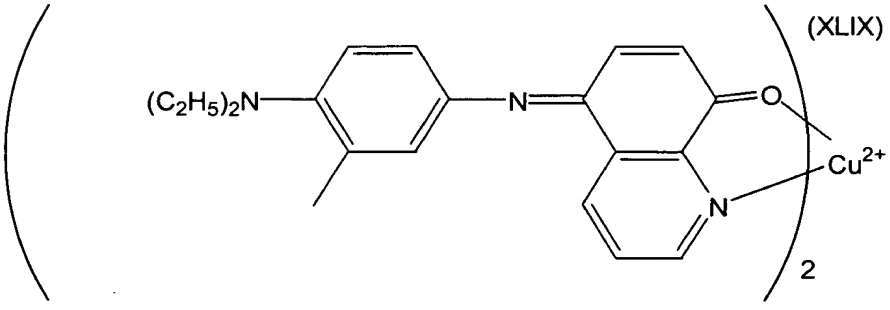


A1 cont'd

(XLVIII)



(XLIX)



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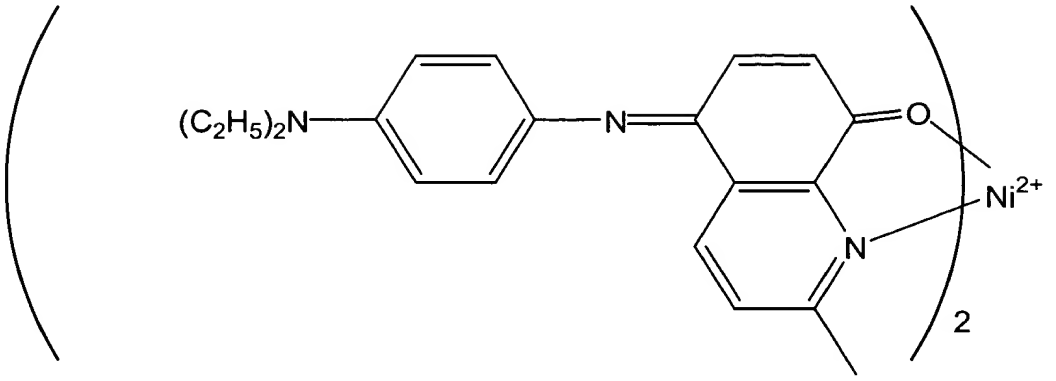
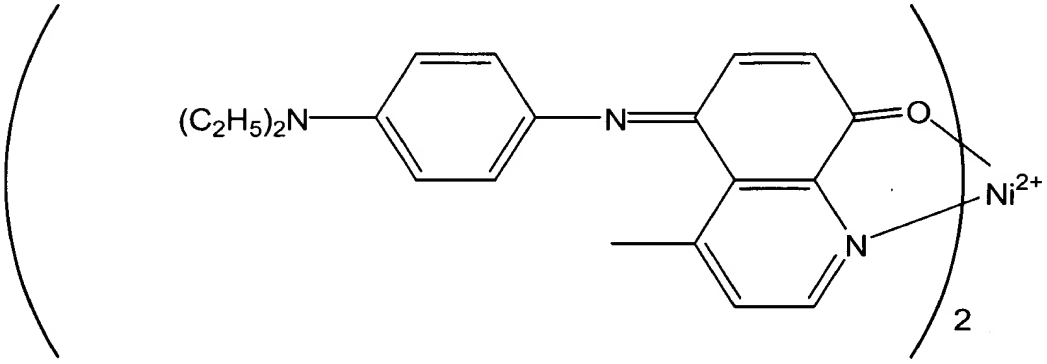
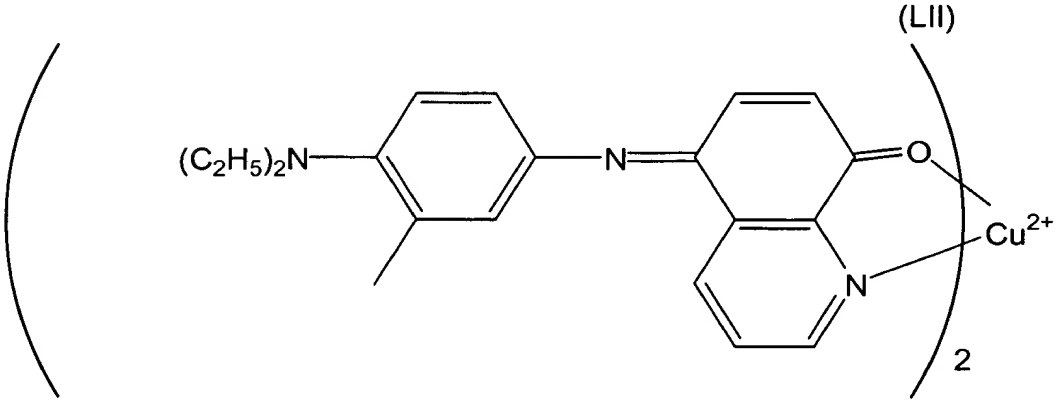
(L)



(LI)



(LII)



161. The method of claim 146 wherein the heat sensitive dyes comprises Basic Green 4; Solvent Yellow 56; Chemithermal CFBK90; Chemithermal CFBK120; Chemithermal CFBE90; Chemithermal CFBE120; Permanent Temp Tell Yellow Ink; Permanent Temp Tell Red Ink; Permanent Temp Tell Blue Ink; Permanent Temp Tell Green Ink; Permanent Temp Tell Orange Ink; Permanent Temp Tell Purple Ink; and Permanent Temp Tell Black Ink.

162. The method of claim 146 wherein the heat sensitive dyes are leuco dyes selected from the group consisting of:
aminotriarylmethanes; aminoxanthenes; aminothioxanthenes; amino-9,10-dihydroacridines; aminophenoxazines; aminophenothiazines; aminodihydrophenazines; aminodiphenylmethanes; leuco indamines; aminohydrocinnamic acids (cyanoethanes, leuco methines) and corresponding esters; hydrozines; leuco indigoid dyes; amino-2,3-dihydroanthraquinones; tetrahalo-p,p'-biphenols; 2(p-hydroxyphenyl)-4,5-diphenylimidazoles; phenethylanilines; indanones and combinations thereof.

163. The method of claim 161 wherein the leuco dyes are selected from the group consisting of aminotriarylmethanes, aminoxanthenes, and leucoindigoid dyes.

164. The method according to claim 163, the leuco dyes being aminotriarylmethanes wherein two of the aryl groups are phenyl groups having an R1R2N-substituent in the position para to the bond to the methane carbon atom and wherein each of R1 and R2 are independently selected from hydrogen, C1-C10 alkyl, 2-hydroxyethyl, 2-cyanoethyl, and benzyl and wherein the third aryl group is selected from:

a) phenyl which can be substituted with lower alkyl, lower alkoxy, chloro, diphenylamino, cyano, nitro, hydroxy, fluoro or bromo;

b) naphthyl which can be substituted with amino, di-lower alkylamino, alkylamino;

c) pyridyl which can be substituted with alkyl;

d) quinolyl;

e) indolinylidene which can be substituted with alkyl.

165. The method according to claim 164, wherein R1 and R2 are selected from hydrogen and alkyl of 1-4 carbon atoms.

166. The method according to claim 163 wherein the aminotriarylmethanes are selected from tris(N,N-dimethylaminophenyl)methane (LCV); deutero-tris(N,N-dimethylaminophenyl)methane (D-LCV); tris(N,N-diethylaminophenyl)methane(LECV); deutero-tris(4-diethylaminolphenyl)methane (D-LECV); tris(N,N-di-n-propylaminophenyl)methane (LPCV); tris(N,N-din-butylaminophenyl)methane (LBCV);

bis(4-diethylaminophenyl)-(4-diethylamino-2-methyl-phenyl)methane (LV-1); bis(4-diethylamino-2-methylphenyl)-(4-diethylamino-phenyl)methane (LV-2); tris(4-diethylamino-2-methylphenyl)methane (LV-3); deutero-bis(4-diethylaminophenyl)-(4-diethylamino-2-methylphenyl)methane (D-LV-1); deutero-bis(4-diethylamino-2-methylphenyl)(4-diethylaminophenyl)methane (D-LV-2); bis(4-diethylamino-2-methylphenyl)(3,4-dimethoxyphenyl)methane (LB-8);

167. The method of claim 166 wherein the aminotriarylmethane leuco dyes have alkyl substituents selected from C1-C4 alkyl, the substituents bonded to the amino moieties.

168. The method of claim 167 wherein the aminotriaryl methane leuco dyes are further substituted with one or more alkyl groups on the aryl rings, the alkyl groups being independently selected from C1-C3 alkyl.

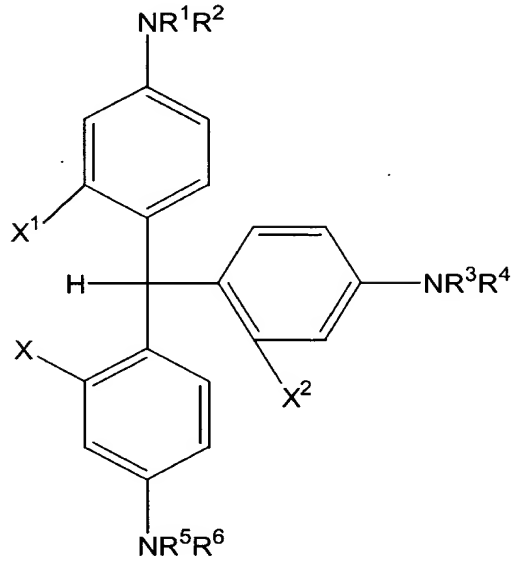
169. The method of claim 166 wherein the amino triarylmethane leuco dyes are selected from the group consisting of: D-LECV, LV-1, LV-2, D-LV-1, and D-LV-2.

170. The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is selected from LV-1 and LV-2.

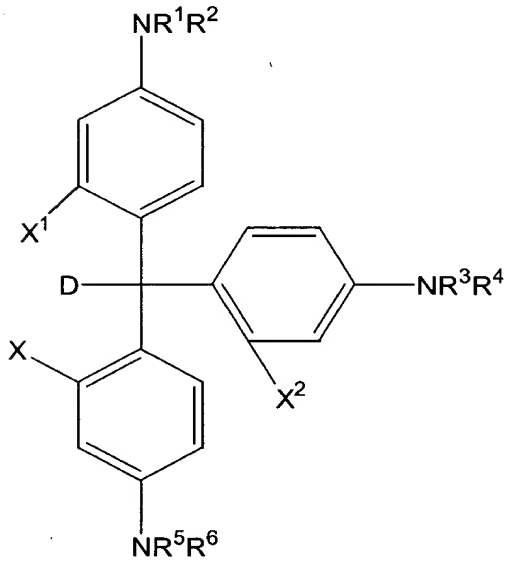
171. The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is Trans-3-hydroxy-2-(p-diethylaminobenzyl)indanone (LY-1).

172. The method of claim 169 wherein at least one of the aminotriarylmethane leuco dyes is Benzo((a)-6-N,N-diethylamino-9-(2-methoxycarbonyl)-phenylxanthene (LM-5).

173. The method of claim 169 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures I and II:



I



II

wherein I and II have components X, X_1, $X_2$and R_1 through R_6 selected from a) through g):

a) X, X^1 and X^2 are H; R^1 through R^6 are H.

b) X, X^1 and X^2 are H; R^1 through R^6 are CH_3.

c) X, X^1 and X^2 are H; R^1 through R^6 are C_2H_5.

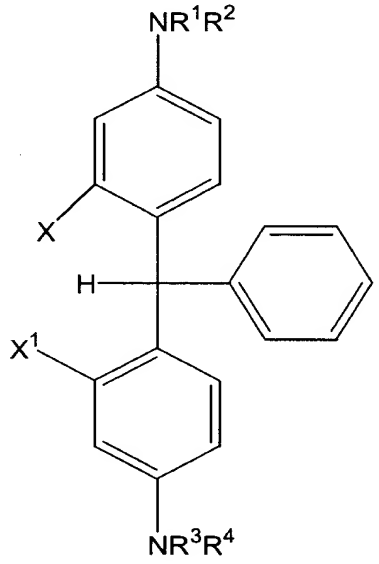
d) X, X^1 and X^2 are H; R^1 through R^6 are independently selected from H and C3-8 alkyl.

e) X and X^1 are H; X^2 is CH_3; R^1 through R^6 are independently selected from H and C1-C8 alkyl.

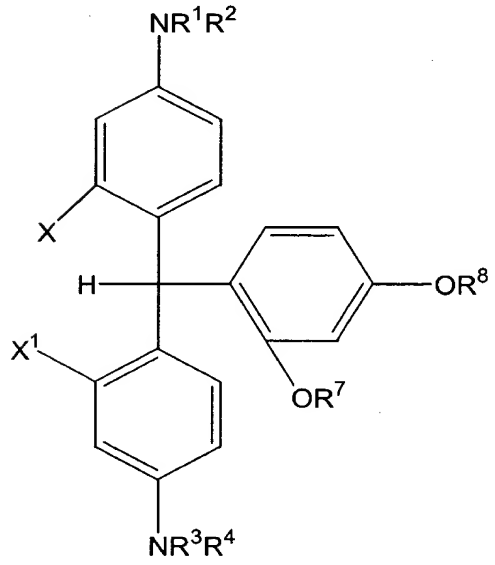
f) X is H; X^1 and X^2 are CH_3; R^1 through R^6 are independently selected from H and C1-C8 alkyl.

g) X, X^1 and X^2 are H; R^1, R^3 and R^5 are independently selected from aryl C6-C10; substituted C6-C10 aryl; and R^2, R^4, and R^6 are H.

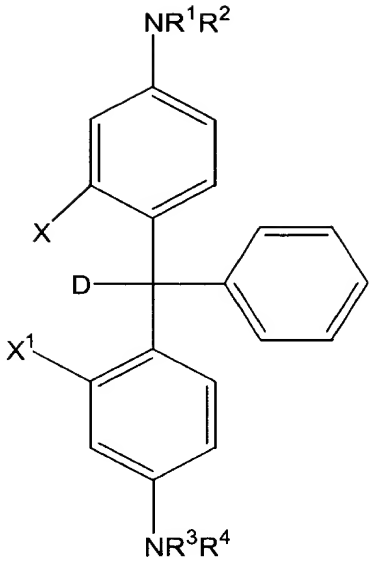
174. The method of claim 167 wherein the aminotriarylmethane leuco dyes comprise at least one of chemical structures III through VI:



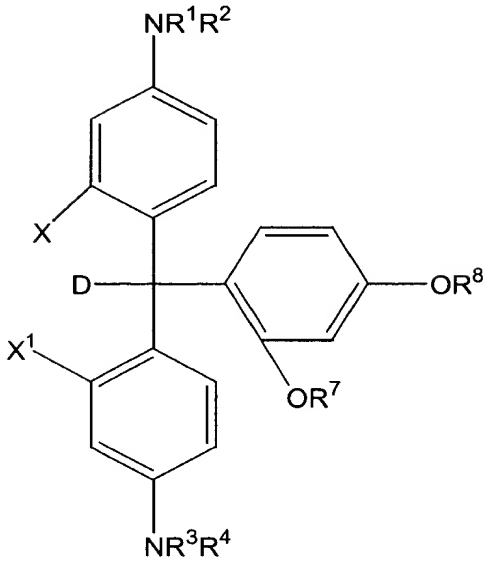
III



IV



V



VI

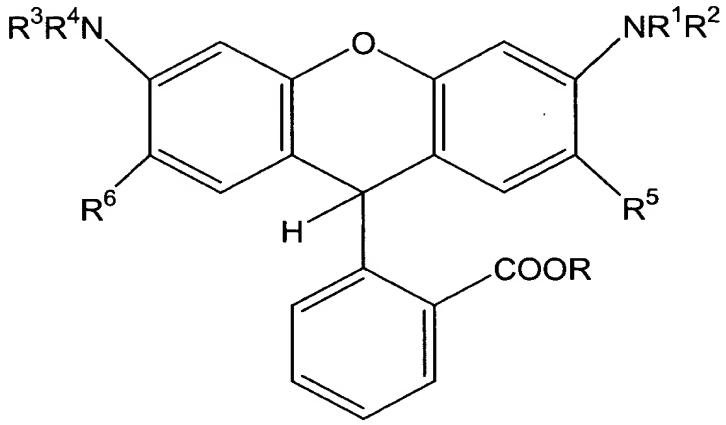
wherein III through VI have components X, X1, X2 and R1 through R6 selected from a) through c):

a) X and X^1 are H; and R^1 through R^4 are independently selected from H and C1-C8 alkyl

b) X and X^1 are H and R^1 and R^3 are aryl; and R^2 and R^4 are H

c) X = CH_3, X^1 = H and R^1 through R^4 are independently selected from H and C1-C8 alkyl; and R^7 and R^8 are independently selected from C1-C8 alkyl, or R^7 and R^8 are bridged to form a cyclic attachment with a CH_2- or C_2H_4- bond, thereby forming a five- or six-membered ring, respectively.

175. The method of claim 169 wherein the aminotriarylmethaneleuco dyes comprise chemical structure VII:



wherein R is independently selected from H, C1-C8 alkyl; R^5 and R^6 are independently selected from H and C1-C4 alkyl; R^1 through R^4 are independently selected from H and C1-C6 alkyl, C6-C10 aryl with the proviso that, if R^1 and R^3 are aryl, then R^2 and R^4 are hydrogen.

176. The method of claim 163 wherein the leuco dyes comprise at least one of aminotriarylmethanes and aminoxanthenes.

177. The method of claim 148 wherein the heat sensitive dyes are near IR-absorbing dyes comprising at least one of

1) DF-1: 2-((2-((2-chloro-3-(((1,3-dihydro-1,3,3-trimethyl-2H-indol-2-ylidene)ethylidene)-1-cyclopenten-1-yl)ethenyl)-1,3,3-trimethyl-3H-indolium trifluoromethanesulfonate;

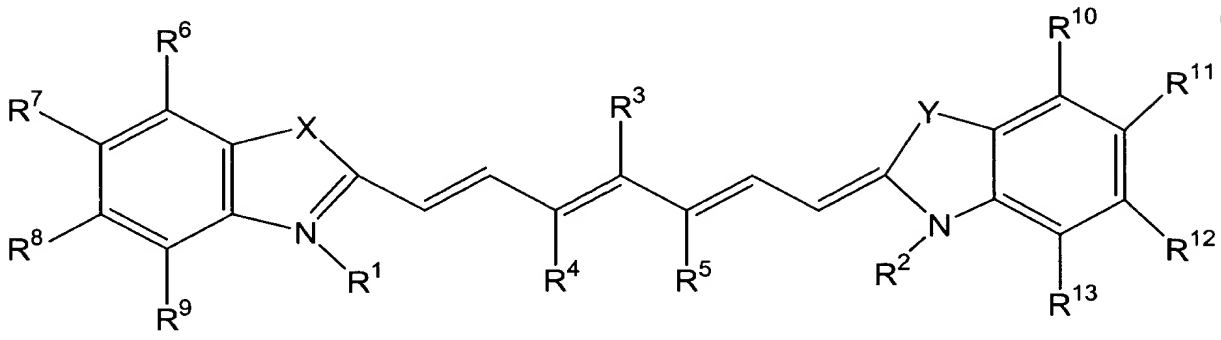
2) RD-1: Cyasorb® IR-165 Near IR Dye(absorption maximum at 1070 nm); and

3) SQS 4((((3-((((2,6-bis(1,10-dimethylethyl)-4H-thiopyrann-4-ylidene)methyl)-2-methyl)2-hydroxy-4-oxo-2-cyclobuten-1-ylidene)methyl-2,6-bis(1,1-dimethylethyl)thiopyrilium hydroxide, inner salt,

178. The method of claim 177 wherein the heat sensitive dyes are near IR absorbing dyes comprising at least one of DF-1 and RD-1.

179. The method of claim 178 wherein the heat sensitive dyes are near IR absorbing dyes comprising DF-1.

180. The method of claim 146 wherein the heat sensitive dyes comprise Heptamethine cyanine dyes having a chemical structure (VIII) as shown below:

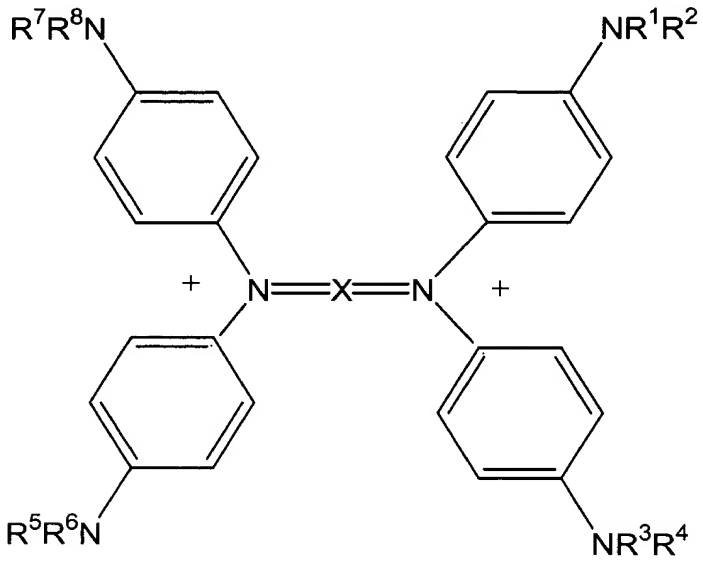


(VI

where R3 can be H, halogen, alkyl, aryl, aryl, alkoxy, aryloxy, thioalkyl, or thioaryl; R4 and R5 are independently selected from H, alkyl, aryl, or are bridged to form a cyclic attachment; each of R6 through R13 is independently selected from H, alkyl, aryl, or any two adjacent R6 through R9 and any two adjacent R10 through R13 can form R10 through R13 can form a fused aryl; each of R1 and R2 are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R' where R', R" are independently selected from alkyl, aryl and substituted alkyl; X and Y, which may or may not be identical, are each represented by the formula CR'R" where R', R" are independently selected from H, C1-C6 alkyl, O, S, Se and Te.

181. The method of claim 146 wherein the heat sensitive dyes comprise Benzenaminium dyes having structure (IX) as shown below:

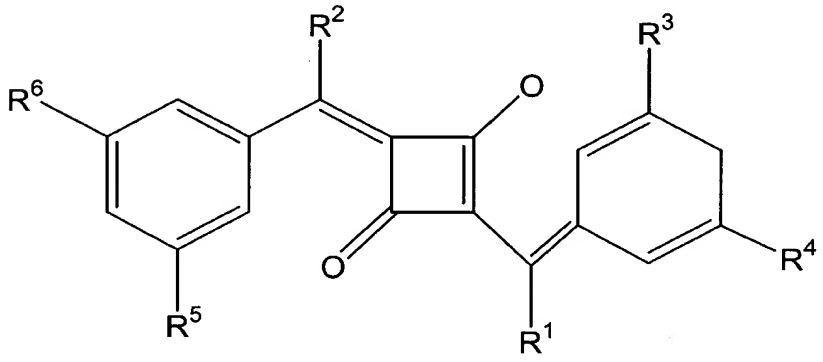
(IX)

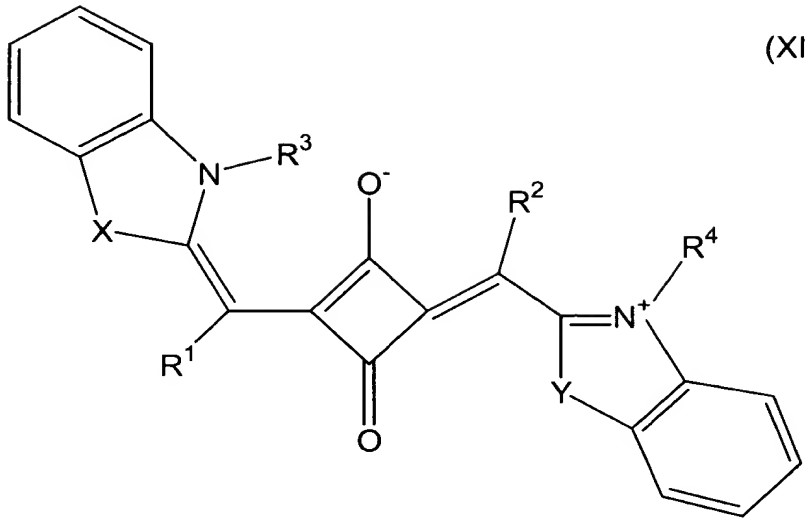


wherein each of R^1 through R^8 is independently selected from C1-C6 alkyl; X is a substituted 1,4-cyclohexadiene.

182. The method of claim 146 wherein the heat sensitive dyes are near IR-absorbing dyes having structure (X) or structure (XI) as shown below:

(X)



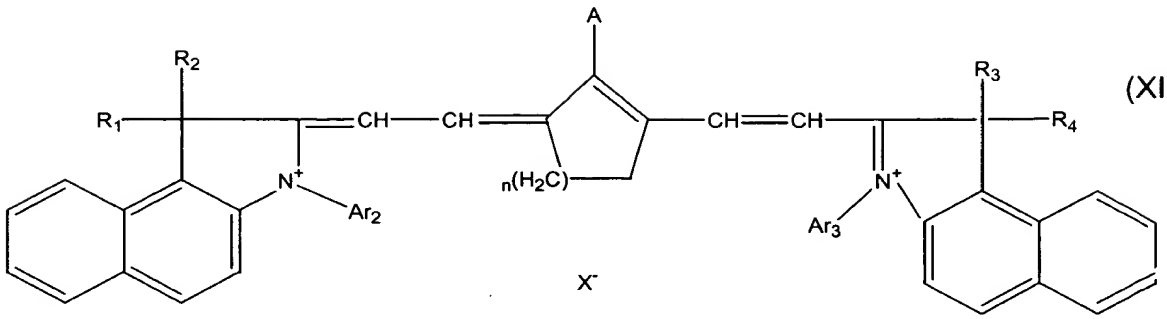


(XI)

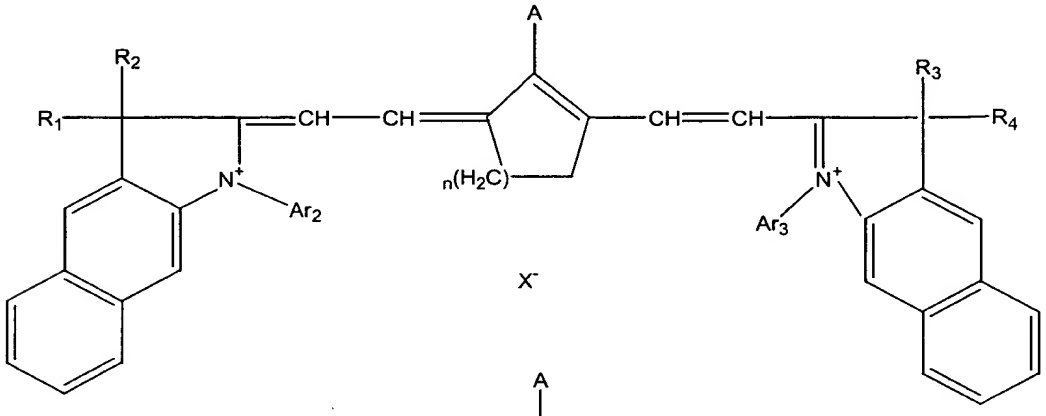
wherein each of R1 through R6 is independently selected from H, C1-C6 alkyl; X and Y are independently selected from O, S, Se, Te, N-R7, wherein R7 is selected from C1-C6 alkyl and

wherein each of R1 and R2 is independently selected from H, C1-C6 alkyl; each of X and Y is independently selected from O, S, Se, Te, N—R7,wherein R7 is selected from C1-C6 alkyl; each R3 and R4 is independently selected from alkyl, aryl or substituted alkyl and wherein the benzene rings in structure (XI) may be further substituted.

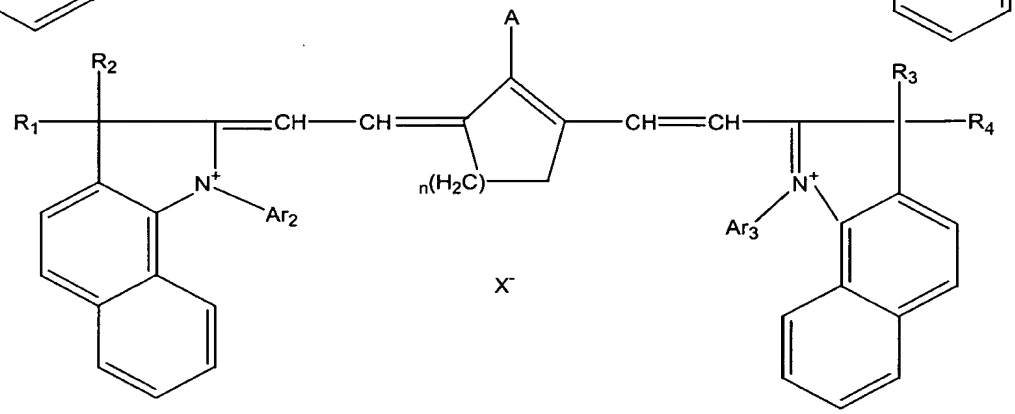
183. The method of claim 146 wherein the heat sensitive dyes are near IR-absorbing dyes selected from the group consisting of:



(XII)



(XIII)



(XIV)

wherein R1-R4 are independently substituted or unsubstituted C1-C6 alkyl; A is substituted or unsubstituted phenyl, naphthyl, C1-C6 alkyl, or C7-C10 aralkyl; Ar2 and Ar3 are independently substituted or unsubstituted phenyl or naphthyl; X is a monovalent anion; and n is 1 or 2.

184. The method of claim 183 wherein the alkyl, aryl or aralkyl substitution groups comprise at least one of: hydroxy, alkoxy, chloro, bromo, cyano, and amino.

185. The method of claim 146 wherein the heat-sensitive dyes are near IR-absorbing dyes selected from the group consisting of: 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-1); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((e)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((e)indolium p-toluenesulfonate (JC-2); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-3); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((f)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((f)indolium p-toluenesulfonate (JC-4); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclohexen-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-5); 2-((2((3-((((1,1-dimethyl-1,3-dihydro-3-phenyl-2H-benz((g)indol-2-ylidene)ethylidene)-2-phenyl-1-cyclopenten-1-yl)ethenyl)-1,1-dimethyl-3-phenyl-1H-benz((g)indolium p-toluenesulfonate (JC-6).

A1 cont'd

186. The method of claim 185 wherein the near IR-absorbing dyes comprise at least one of JC-1 and JC-2.

187. The method of claim 185 wherein the near IR-absorbing dyes comprise JC-1.

188. The method of claim 146 wherein the light sensitive and temperature sensitive dyes are encapsulated in microcapsules, the microcapsules comprising polymers having T_g from 80°C to 200°C.

189. The method of claim 188 wherein the polymers are selected from the group consisting of polyurethanes, acrylates, styrenes and combinations thereof.

190. The method of claim 188 wherein the polymers comprise styrene-butylacrylate-polyethylene glycol acrylate.--